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A broad range of topics deals with the development, maintenance, and full utilization of a healthful school environment, encompassing such areas as--(1) school organizations which affect the student environment, (2) accident prevention, (3) the criteria for healthful food services, (4) physical education and the necessary athletic facilities, (5) full utilization of health education resources, and (6) the effect teachers have on the emotional tone of a classroom. Corresponding to these policies, services and procedures are the treatment of more physical aspects of school environments and how they may affect physical and mental health--(1) proper site selection, (2) building design, (3) lighting, (4) acoustics, (5) ventilation, and (6) utilities. A bibliography follows each chapter. (KK)

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Healthful School Environment

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publication of The Joint Committee on Health Problems in Education of the National Education Association and the American Medical Association and prepared with the assistance of numerous contributors and consultants

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complete revision of *Healthful School Living* (1957)

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Preface

With the publication of HEALTHFUL SCHOOL ENVIRONMENT, a revision of the 1957 book, *Healthful School Living,* the trilogy of books sponsored and prepared by the Joint Committee on Health Problems in Education of the National Education Association and the American Medical Association is brought up to date. *Health Education* and *School Health Services,* the other two parts of the trilogy, were revised in 1961 and 1964 respectively.

The word *environment* is used in the title of this book to emphasize the importance of the ecology of pupils' school experiences and to fit more closely the familiar triumvirate of education, services, and environment. In this context, environment includes the activities carried on in the classroom and other instructional areas and the experiences and relationships that give the school its emotional climate.

Charles C. Wilson, M.D., and Elizabeth Avery Wilson, Ph.D., both of whom have been closely associated with the Joint Committee for many years, were editors for HEALTHFUL SCHOOL ENVIRONMENT. The former edited several previous publications of the Committee; the latter served as liaison between the Joint Committee and the National Education Association for a period of time and was a member of the Editorial Committee for previous publications. The experience of the editors greatly facilitated the preparation of this publication.

The Editorial Committee planned the scope and content of the book, selected contributors and consultants, reviewed several drafts of each chapter, suggested desirable changes and additions, and guided the editors in their work. All chapters were reviewed by members of the Joint Committee and by consultants selected for their particular competence in specialized fields. The Editorial Committee approved the final draft of the manuscript, and its publication was authorized by the Joint Committee.

Much constructive help was provided by staff members of both the National Education Association and the American Medical Association. The Publications Division of the National Education

Association supervised publication arrangements. Kirsten Carter of the Publications Division handled copy editing and editorial production. The index was compiled by Mary G. Hannan of Crystal Lake, Illinois. We gratefully acknowledge the assistance of all who had a hand in the book's preparation.

This book is written for students in education, public health, medicine, and nursing. Like other publications of the Joint Committee, it will serve as a valuable reference for teachers, school administrators, members of boards of education, and all others with responsibility for planning or conducting a school program.

As chairmen of the Joint Committee during the period of its preparation, we take pleasure in presenting HEALTHFUL SCHOOL ENVIRONMENT.

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The Joint Committee on Health Problems in Education is indebted to the many persons who gave generously of their talent and time to help in the preparation of HEALTHFUL SCHOOL ENVIRONMENT. Some served as contributors and others as consultants. Each contributor prepared basic material for one of the chapters. Certain chapters in the earlier version, *Healthful School Living* (1957), contained material which was useful in the present volume. Although the Committee assumes full responsibility for the viewpoints expressed herein, it recognizes that the material supplied by contributors was essential to the development of this book.

Each chapter was reviewed by several consultants with special competence in the area. Consultants checked the accuracy of statements, suggested changes, and expressed opinions on various topics. Thus the Committee was assured that each chapter reflects a consensus of professional opinion.

The Committee is grateful to all who assisted in the development of this publication.

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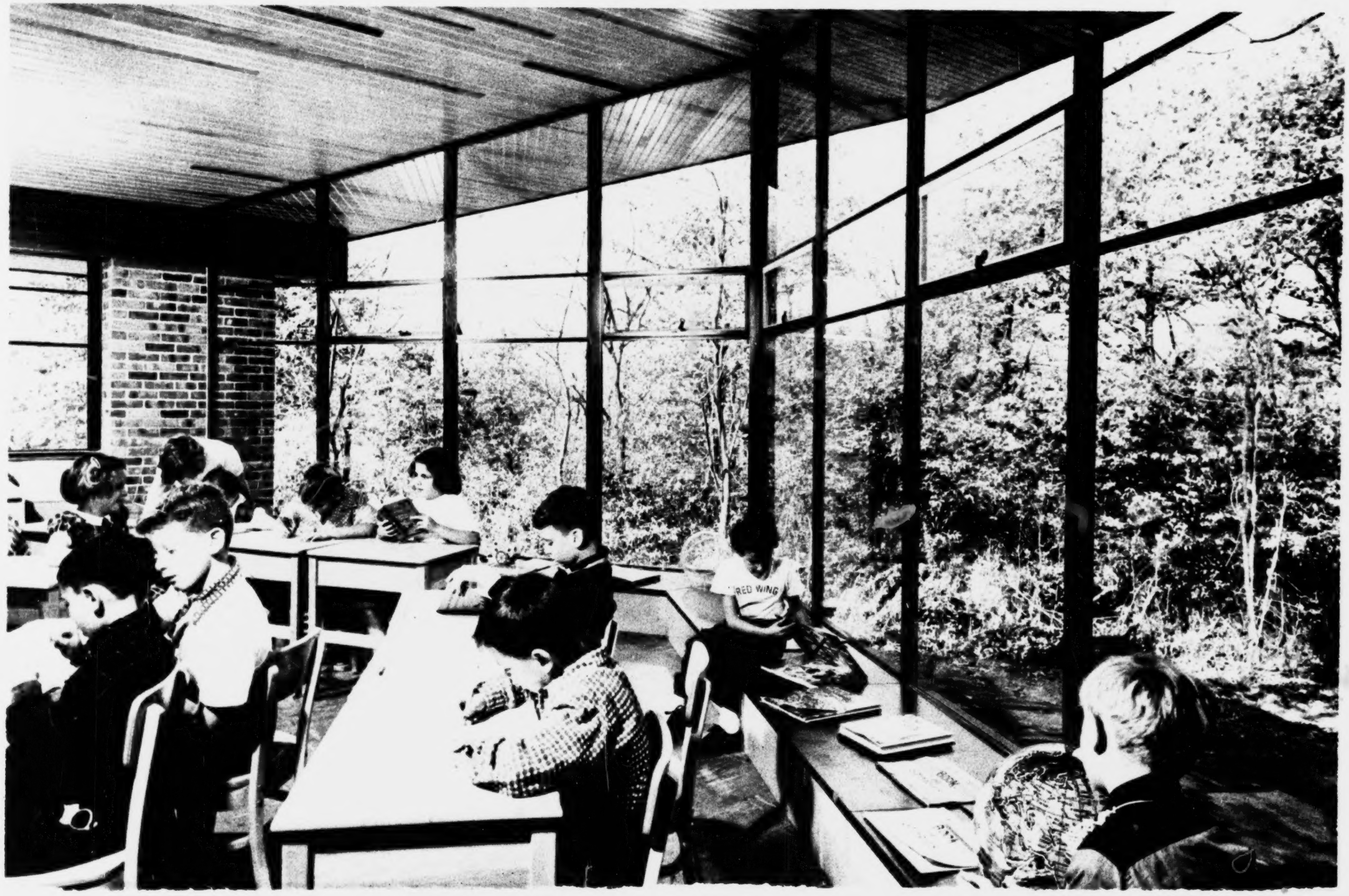
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Chapter 1

The School Environment and Health

Birch trees won't grow in a warm climate, but palm trees will; most orchids grow best in a tropical region, while daffodils thrive only in cool surroundings. All plants respond to their environment. Favorable environmental conditions stimulate growth and development; unfavorable ones retard these processes. This generalization is as applicable to the human organism as it is to plants and explains why a person is a product, in large measure, of his environment.

Heredity sets the upper limit to development, but whether we reach those upper limits depends upon the thousands of forces bearing upon us throughout our lifetime—some favorable and others unfavorable. As an important force affecting the children and youth of our country, what kind of environmental conditions do schools provide?

When compulsory education laws were passed, requiring every child and youth between certain ages to attend school for a set number of hours a day for a specified number of days each year, they imposed upon pupils a situation and an environment which all were not equipped to handle with ease. Today millions of young people are going to school, and many are confronted with conditions detrimental to their well-being. "Going to school," exciting and developmental though the experience may be, is not always an unmixed blessing. In fact, the experience may sometimes actually retard learning or endanger health.

Most of the problems associated with going to school stem from the peculiar but widely held view that the sole objective of education is acquisition of knowledge. The subject matter is there; lessons are to be learned; twelve or sixteen years are supposed to be sufficient to accomplish the task. If a child or youth fails, it is because he did not apply himself. The pupil may find that no one is interested in him as an individual or in the environment into which he, by law, has been pressed.

Going to school is a total experience, not just an intellectual one. Once a child enters kindergarten or first grade, he will never be the same. From his first day in school, and for as long as he continues in school, he will be affected intellectually, socially, physically, and emotionally. This is an inescapable fact of life, but there are some adults concerned with the expanding scope of education who prefer to ignore it. They say that the only function of the school is to develop the pupil intellectually.

People with this philosophy imply that the school has no responsibility for the physical, social, and emotional development of pupils. They feel that a safe environment needs to be provided and that the school should concentrate solely on intellectual matters. The artificial separation of *mind* from *body* may be convenient, but its attainment is impossible since the pupil is an indivisible being. While intellectual pursuits are undertaken, the physical, emotional, and social aspects of the individual are being affected, whether or not the teacher knows or cares. A child, youth, or adult is divisible only in the minds of those who wish to divide him so as to concentrate attention on a particular part of the total person.

In a similar manner, it is a mistake to believe that a school health program should be concerned only with the physical aspects of children and youth. To be sure, many people still think of health mainly in physical terms and understand the goals of physical well-being more clearly than the goal of total health. But the holistic nature of man makes it unrealistic to fragmentize him, to be concerned with his physical health to the exclusion of the other dimensions.

The sensitive educator knows that mental, social, emotional, and physical health are merely different aspects of the same thing. The proven interrelationship of vital functions—for example, of the heart to anxiety, of emotions to digestion, of digestion to happiness, of fatigue to success, and of motor coordination to learning—causes the educator to understand that both learning and health involve all aspects of the individual.

Twentieth-century educational thought recognizes that an understanding of the nature of the learner is basic to good teaching. The preparation of a teacher must be based on the study of children and youth, the way they grow and develop, the way they adapt to their environment, and the way they react to the stresses of modern education.

SOCIAL AND PSYCHOLOGICAL IMPLICATIONS

There is a vast difference between the relative quiet of a family gathering and the organized pressures and hurly-burly of a classroom. School opens up a world of new faces, new companions, and new friendships. Pupils of all grades live in a world of assigned or selected tasks, of regulated speech, of homework, and of discipline. Pupils experience freedom in some areas of activity and restriction in other areas. Through long periods of trial and error, they learn the desirability of respecting the rights of other persons.

School organization plays an important role in shaping the environment to which children and youth will be exposed. It may provide opportunity for association with those who have similar or dissimilar social and educational backgrounds. It may group pupils who have similar mental abilities, or it may organize into a group pupils whose mental abilities run the gamut from very low to very high. The marking and grading system, promotional procedures, policies relating to discipline, and the type of school reports to parents are among many organizational factors that affect pupils' health and well-being. To illustrate, if the rules and regulations of pupil conduct have no rationale in terms of today's mores, rebellion may develop and both anger and tears spill over.

The school environment requires interaction and orientation, the skills of which must be learned or social and personal disaster may follow. A pupil may learn prejudice and bias or open-mindedness and acceptance. An inferior teacher may turn a pupil away from learning forever, and a superior teacher may light fires of scholarship that will burn for a lifetime. Here the competitive world is met head on with success or failure, self-fulfillment or frustration.

The tremendous importance of the school environment in helping pupils learn how to live with one another has never been completely described. It is clear, however, that the greatest possible success will be achieved only when boards of education and administrative and teaching staffs are sensitive to the potentialities involved. Boards of education must adopt policies that recognize the need for pupils to learn how to react in social situations. The administrative staff needs to organize the school in such a manner as to contribute to pupil growth and development, and the teaching staff should conduct its program with proper weight to helping pupils understand the ways individuals and groups react to one another.

The implications of going to school as a total experience cannot be dodged. Whether architects know it or teachers are aware of it, being in a building and in a class, listening to authority figures, and being chided or praised by his peers have an influence on the total health and well-being of a pupil. An attractive, appropriately located, and well-maintained school building with adequately lighted, tastefully decorated classrooms and modern equipment throughout can make a major contribution to the education of children and youth. Comfortable seating influences pupils' attitudes toward their work and their school. If, for example, the seat is uncomfortable, the back becomes fatigued and, even more important, the pupil's attitude toward his entire school program may be so affected that a problem learner is produced.

Teachers, physicians, and guidance personnel recognize the variety of personal problems which pupils face. These relate to under- or over-achievement, accommodation to school routine or discipline, adjustment to sexual maturity, sibling rivalry, parental supervision, and dozens of other influences bearing on children and youth. The skilled teacher helps to prevent these problems from developing, gives help to pupils experiencing minor difficulties, and refers pupils with serious problems to those who have the skill to deal with them.

As they go about their daily tasks, pupils learn about personal acceptance and rejection, prejudice and selfishness, alibiing and projection, jealousy and anger. They learn about worry and security, frustration and success. Their experiences include the whole spectrum of human behavior. The way the teacher helps pupils learn about these matters is an indication of his contribution to the pupils' mental and social health. The social and psychological development of pupils should be of as much concern as their success in various other aspects of the curriculum.

School efforts to promote the emotional and social development of pupils center around the classroom teacher. The teacher tends to establish the emotional climate that pervades the classroom. He determines the emotional satisfactions that pupils gain by his methods of teaching and his adaptation of curriculum content to their abilities. The competent teacher who is healthy and has a pleasing personality helps to provide an environment in which pupils thrive.

THE PHYSICAL ENVIRONMENT

Nothing is more certainly predictable than that a living organism will react to its physical environment. An infant will open or close its eyes in response to light, turn its head to follow sound, and cry in tactile discomfort. Just as surely, but in different ways, children and youth react to the physical environment of schools. The environment may produce comfort or discomfort, arouse feelings of pride or feelings of disgust and depression, encourage or retard learning, allow the easy spread of communicable diseases or safeguard health, and increase or decrease the possibility of accidents. The provision of a safe, sanitary, and attractive physical environment pays big dividends.

Attention to the physical environment begins when a school building is being planned and continues as long as the building is used. Space is provided in regular classrooms and special rooms to prevent overcrowding and to permit those activities included in the locally accepted educational program. Lighting is both adequate and proper; noise is at a minimum due to careful acoustical measures; heating and ventilation are effective, and, in some regions, air conditioning is provided; furniture is suitable and attractive; and color is used to serve numerous purposes. An ample supply of safe water is assured, together with adequate plumbing and a sufficient number of such fixtures as wash basins, drinking fountains, and toilets. Proper disposal of wastes safeguards the health of pupils and school personnel.

Custodial and maintenance services should keep rooms clean and buildings in proper repair. Corridors, cafeterias, laboratories, gymnasiums, and playing fields should show the results of good housekeeping and proper maintenance.

School physical facilities should include suitable space and equipment for preparing and serving lunches. A kitchen, food storage space, and a dining room are now considered integral parts of a school building.

School life does not contribute to health if pupils are unnecessarily exposed to communicable diseases. If a pupil contracts tuberculosis or some other communicable disease from a school employee or a fellow pupil, parents have every reason to become aroused and to challenge the board of education to explain the precautions taken to prevent the spread of disease. Good sanitation is a preventive measure but needs to be supplemented with established policies and procedures dealing with such matters as immunizations, case-finding, isolation and exclusion, and readmission following sickness. Programs in these areas will naturally be developed in cooperation with the local health department, parents, physicians, voluntary health agencies, and other interested groups.

The school environment has direct implications for accident prevention, since pupils cannot be completely safe unless measures are taken to identify and eliminate accident hazards and to prevent or deal with disaster situations.

Accidents happen. Only the naive or ignorant believes that a school can be operated without them. However, when a parent sends a pupil to school he does not expect him to get hurt on the way or to be injured in a classroom, corridor, laboratory, gymnasium, or playing field. He expects that the school will be a safe place for living and learning.

School personnel have three basic responsibilities in regard to accidents and emergency situations: The first is to prevent accidents from happening, when and if this is possible; the second is to include safety instruction as part of the curriculum; and the third is to execute a program of action when an emergency occurs.

All too frequently these responsibilities are neglected due to the assumption that an emergency will not occur or that if one does it will be handled by common sense. Neither of these points of view is tenable. Accidents, fires, explosions, and emergencies of many other kinds frequently occur at unexpected times and places. The resulting situation may be aggravated by panic and excitement and by forgetfulness or a lack of knowledge concerning what should be done by one or more key persons. The unexpected must be prepared for. Policies to meet every contingency must be made ahead of time, and all school personnel should become familiar with them.

A school health committee or health and safety committee may desirably consider a variety of safety problems. The group can develop programs for the emergency care of injured pupils; for action to be taken in case of fire, flood, tornado, or explosion; for traffic safety; for elimination of accident hazards; and for the prevention of accidents in all parts of the school building and on the school grounds. Only when this is done can it be said that the school is meeting its obligation in this area.

PHYSICAL ACTIVITY AND LEARNING

The human organism is intended to be active. We possess and retain for life all the mechanisms to move about, be vigorous, run and jump, dance and play. It is an erroneous notion to believe that only little children should be active. Play, exercise, and activity are psychobiological necessities, a heritage for all. The school that does not provide a time and place for play is organized counter to the very nature and purpose of human life.

Our puritanical forefathers gave little credence to the belief that play and fun were desirable. Since they did not know as much about the human organism and its needs as we do now, they felt that schooling had to be a grim and serious business. This tradition lingers. It is the reason that some people consider "hard" subjects, like Latin, mathematics, and physics, better than "easy" subjects. It also partially explains why many people have a rather astigmatic view of the kind and quality of learning and the degree of personal development that can result from well-organized physical education and recreation.

Play has long been underrated as an influence in promoting mental health. According to Menninger, "Good mental health is directly related to the capacity and willingness of an individual to play. Regardless of his objections, resistance, or past practice, any individual will make a wise investment for himself if he does plan time for play and take it seriously." [1]

A well-conceived program of physical education and recreation can provide participants with opportunities to enjoy the satisfactions of achievement. It can serve in the cultivation of an objective and realistic outlook as contrasted with a subjective and fancied one. It further provides opportunities for a pupil to establish status among his peers, to understand himself, and to find satisfactions which come from identification with a group. Above all, such programs provide opportunities to enjoy life and to experience pleasure. Thus, one thing to look for in judging the potential influence of any school on the health and development of pupils is the time, space, and facilities devoted to physical education.

THE CHALLENGE

A healthful environment is essential if children and youth are to live healthfully while at school. Healthful school living is not a mysterious phrase with ambiguous implications. It simply means living within a school where all environmental conditions, every social relationship, and every curriculum experience is carried on with due attention to health. None of these conditions or experiences should be allowed to endanger health or safety; they all should contribute to well-being.

In many schools, both elementary and secondary, careful attention is given to all aspects of school sanitation; teachers and administrators strive to create desirable emotional and social conditions and to help each pupil develop his potentialities to the fullest degree possible. Pupils attending such schools are indeed fortunate.

---

[1] Menninger, William C. "Recreation and Mental Health." *Recreation* 42: 341-45; November 1958.

The challenge to teachers, administrators, and boards of education is to create and maintain in every school an environment that makes healthful living possible. In the chapters that follow, aspects of various school conditions and programs that significantly affect health are described and discussed, thus providing information that can be used to establish desirable environmental conditions.

Healthful school living is one side of a school health triangle, the other two sides being health education and school health services—subjects which are dealt with fully in previous publications of the Joint Committee on Health Problems in Education of the National Education Association and the American Medical Association.[2] Although possessed of its own characteristics, healthful school living is closely related to the two other parts of the program. Healthful living is a goal of health education, since it increases a pupil's understanding and appreciation of health and the factors that influence it. School health services, particularly those directed toward maintaining sanitary and safe school conditions, help to provide an essential foundation for healthful school living. Consequently, school health services are as indispensible as health education in promoting healthful school living.

A program to provide a healthful school environment is a cooperative venture that involves many people. The teacher is the key person in controlling conditions and conducting activities in the classroom, but his efforts need to be bulwarked by assistance from many other staff members. Superintendents, principals, and others concerned with school administration share in developing conditions conducive to good health. Physicians and nurses serving the school often provide leadership in developing school health procedures, including the inauguration of periodic sanitary inspections. Curriculum directors, psychologists, social workers, lunch room managers, and custodians are other persons who help to create a healthful school environment. To the extent that these individuals work together toward common ends, healthful school living becomes an attainable goal.

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[2] National Education Association and American Medical Association, Joint Committee on Health Problems in Education. *Health Education.* Fifth edition. Washington, D.C., and Chicago: the Associations, 1961.

National Education Association and American Medical Association, Joint Committee on Health Problems in Education. *School Health Services.* Second edition. Washington, D.C., and Chicago: the Associations, 1964.

Chapter 2

School Organization and Pupil Health

The school is a place of promise, of hope, and of inspiration. It is a place where pupils grow and learn as they travel the road from childhood to maturity. School organization should help pupils learn effectively, grow into healthy and mature adulthood, and become self-respecting and self-directing individuals with concern for their fellow human beings. A good school is constructed on the experience of the past, the needs of today, and the probabilities of the future.

The rapidity of change in all facets of American life in recent years has been breathtaking. Inevitably, major social and technological changes are reflected in schools. The population boom, the knowledge explosion, automation, and technological developments have affected the organization of schools and the people within them. They have resulted in the development of new organizational patterns with emphasis on innovation in education; changes little dreamed about a few years ago are now a reality in many schools.

This chapter will point up some aspects of school organization with implications for pupil health that have stood the test of time and some trends that seem to be developing. Particular attention will be given to forces affecting organization, time allotment, pupil grouping, size of classes, tone of the school, and transportation.

FORCES AFFECTING SCHOOL ORGANIZATION

The organization of a school system is becoming increasingly complex. Education is being extended both downward and upward; preschool and kindergarten education are receiving increased attention, and junior colleges are being added at a rapid rate. A number of different organizational patterns are in operation throughout the country, and new ones are being tried. The test of any of these patterns is its ability to help pupils learn and the extent to which it facilitates the achievement of educational goals. The nature of the growth of children and youth and their individual growth patterns emphasize the need for continuity in the educational program.

Challenges and Responses

Until a few years ago, the prevailing pattern of school organization in this country was characterized by neighborhood schools, with a single class to a room. Classes were definitely graded, and there was limited departmentalization.

Forces challenging traditional patterns of school organization are numerous and varied. They include the following:

1. Demand for higher standards of intellectual achievement
2. Recognition of the need for effective programs for the gifted and retarded, as well as for the so-called average child
3. Realization of variations in educational needs due to differences in cultural backgrounds
4. Acceptance of new teaching technics, such as television, kinescopes, programed learning, and language laboratories
5. Awareness of variations in the range and competencies of teachers and in the learning potential of pupils
6. Recognition of the importance of environmental influences on learning during both the preschool and school years
7. Acceptance of the desirability of a heterogeneous grouping of pupils from the social, economic, and racial points of view.

The response to these influences has brought about numerous changes in school organization. There have been demands for nongraded schools, team teaching, and prekindergarten instruction. The need for special programs for varying cultures and for the gifted and retarded has been emphasized. Some educators have suggested the construction of education parks.[1] All of these are attempts to meet individual needs more effectively in the face of growing school enrollments.

Organization Patterns and Health

Since school organization influences the environment to which pupils are subjected, it has an effect on pupil health. Organization determines the number of hours a day a pupil will be in school, the number of days a year he will attend school, the number and characteristics of the classmates he will have, and how he will get to and from school. The way a school is organized may tend to make a pupil work under continuous tension or, on the other hand, may encourage him to work and progress at the rate that is best for him. Organization factors may help him develop feelings of confidence and security or opposite feelings.

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[1] Morphet, Edgar L.; Johns, Roe L.; and Reller, Theodore L. *Educational Organization and Administration.* Englewood Cliffs, N.J.: Prentice-Hall, 1967. p. 315.

Although it is generally accepted that the various aspects of school organization influence pupil health (and this point of view is substantiated by the opinions of experienced teachers and administrators), exact data concerning the health effects of school organization are not available. This is due in part to the difficulty of separating the effect of organizational factors from those that reflect the emotional climate of the classroom, the classroom program, and school administration procedures.

In due time, research will provide answers to questions relating to the effect of these different influences on pupil health. Until then, teachers and administrators should give attention to these matters and be guided by the viewpoints of educators and physicians who are experienced in the area of school health. These viewpoints will be stated and examined in later sections of this chapter and other chapters of this book.

TIME ALLOTMENT

The influence of the school environment on the health of pupils is directly proportional to the amount of time they spend in school. Consequently, such factors as the length of the school day and the school year and the time apportionment during the day should be analyzed carefully from the point of view of the way they affect health.

Length of the School Day

The National Education Association recently secured data from 326 school systems with enrollments of 12,000 or more.[2] A total of 23.6 percent had lengthened the school day; 74.2 percent had made no changes; and only 2.2 percent had reduced the length of the school day. All changes reported had occurred in the five preceding years. The median length of the school day was found to be 6 hours and 16 minutes in grade one and to increase grade by grade to 6 hours and 59 minutes in senior high school. The in-school day for teachers was about one hour longer than that of pupils.

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[2] National Education Association, Research Division. "Length of School Year and School Day." *Research Bulletin* 43: 103-105; December 1965.

Among the factors that have caused some school systems to lengthen the school day are the knowledge explosion, the trend to begin certain academic subjects such as foreign languages early in a child's school experience, and the pressure to add new subjects and activities to the curriculum. While recognizing the importance of these developments, care must be taken to see that the school day does not become so long that pupil health is jeopardized and learning diminished.

In today's schools, time is more fluid and schedules more flexible than formerly. Whether planning a flexible or rigid schedule, it is desirable to provide a balanced program with periods of concentrated mental activity interspersed with less strenuous mental tasks and broken by periods of physical activity. This procedure promotes both mental and physical health.

Whether a school program produces fatigue depends on more than the number of hours in the school day. The nature and pace of instruction and the emotional tone of teacher-pupil relationships greatly influence the extent to which pupils tire. Strenuous work in a relaxed and serene atmosphere may not be as tiring as less arduous work performed under pressure in a tense atmosphere.

Pupil time in school is often increased by voluntary participation in interest-centered activities during after-school hours. These activities may be of a recreational nature, intramural or interscholastic athletics, music or dancing lessons, or various kinds of club activities. Some pupils fail to participate in any of these valuable programs; others tend to become involved in too many school-sponsored activities. Counseling on an individual basis by teachers, parents, and guidance personnel can help pupils work out a balanced program.

Consideration must be given to differing individual and group needs in determining the length of the school day. The healthful and stimulating effect of variety in the daily program and the differences in fatigue levels among various age groups should receive attention. A decision concerning the length of the school day should take into account the importance of avoiding fatigue and boredom, as well as the fact that these conditions are influenced by pupil interest, the alternation of sedentary and active forms of learning, and the emotional climate of the classroom.

Double Sessions

Approximately 2 percent of all elementary school children are on double-session schedules. Double sessions are usually born from the necessity of caring for burgeoning school enrollments when adequate facilities are not available. Many pupils attending double sessions leave home early in the morning or arrive home quite late in the afternoon, depending on whether they attend a morning or an afternoon session.

The types and amounts of educational experiences needed by children and youth simply cannot be compressed into a half day. An additional problem arises when a mother is working and children are left to their own devices without adequate supervision when they are not in school. Many communities are exerting every effort possible to eliminate double sessions.

The Extended School Year

There has been a gradual lengthening of the school year with an earlier opening in September and later closing in June. Strong pressure has appeared in some places to establish a 12-month school year. This pressure stems from a desire to effect economy through better utilization of school buildings and to provide a more varied program.

Classroom teachers generally agree that children show signs of fatigue after a two-month period of school and need periodic vacations. So do teachers. Both children and teachers profit from a change in pace and activities. However, a two- or three-month vacation during the summer may be unnecessary. Studies are needed to determine, if possible, what the optimal length of school terms and of the school year should be.

Summer School

Each year more school systems move in the direction of extending the school year into the summer months, offering remedial and enrichment programs and credit courses for high school students. Thousands of teen-agers are putting their long summer vacation to good use either by working, going to summer school, or gaining experience in community service programs. Many study such subjects as advanced mathematics, field biology, physics, typing, or driver education.

In January 1963 the National Education Association Research Division sent questionnaires to 391 school districts with 12,000 or more pupils enrolled, inquiring about their summer school program in 1962.[3] The results of the survey showed that summer school programs are on the increase and that they often recognize special problems like those of the culturally deprived, the gifted, and the physically handicapped.

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[3] National Education Association, Research Division. "Summer School, 1962." *Research Bulletin* 42: 18-23; February 1964.

Summer school has traditionally offered opportunities for pupils to make up work failed during the regular school term and to strengthen areas in which they are weak. The survey reveals that more than nine-tenths of both elementary and senior high schools reporting offered remedial work in their summer school programs. Only about one-fourth of the elementary schools, while almost three-fourths of the senior high schools, provided for acceleration in summer school programs. Among the remedial programs offered were speech therapy, work with the deaf, and typing for the visually handicapped. Twenty percent of the school systems had instituted their summer programs within the five years preceding the survey.

Enrichment study characterizes many secondary school summer programs, with students having opportunities to select from a wide variety of offerings. Among available areas of study are mathematics, science, English, history, introduction to nursing, music, arts, crafts, and driver education. Such activities are often physically and mentally invigorating. However, students need some absolutely free time of their own. Studies are needed to determine the effects of the fast-paced, crowded school days and extended school year on the health of children and youth.

PUPIL GROUPING

The proper conduct of an educational program requires that pupils in a school, whether they are numbered in the hundreds or thousands, be organized into comparatively small groups or classes. This can be done in one of several ways, producing self-contained, nongraded, or multigraded classrooms. Teaching may be done by a single teacher, a series of teachers in a departmentalized organization, or a group of teachers working together as a team.

Organization of pupils into classes is designed primarily to facilitate learning. However, those concerned with providing a healthful school environment need to consider different patterns of organization and their effects on pupils, particularly in relation to feelings of achievement, feelings of security, and teacher-pupil relationships. Organization patterns suitable for one level of education may be inappropriate at another.

The Self-Contained Classroom

Approximately three-fourths of schools group pupils according to grade level, and the vast majority of elementary school teachers work in self-contained classrooms. Children find stability in having one teacher and in growing accustomed to his routines and ways of working. The teacher sees the child in many different situations and relationships and is with him long enough to know him well. He has the opportunity to manage situations in such a way as to bring out the shy child, redirect the energies of one who is overly aggressive, and help the rejected child become an accepted member of the group.

A well-prepared teacher uses flexible groupings within his classroom; provides large group, small group, and individualized instruction; utilizes a variety of materials of instruction suited to the varying abilities of his students; and encourages more able pupils to help the slower ones.

There are differences in ability which children recognize early, and no grouping arrangement can hide these differences from them. The fundamental question is what type of grouping can best facilitate learning and individual development within a democratic framework.

On the other hand, children do fail and are not promoted to the next grade, with the consequent emotional trauma which failure brings. Repeated failure is disheartening and causes some pupils to leave school earlier than desirable. The bright child, if not challenged, may become an underachiever.

The broad range of requirements of the elementary school teacher makes it practically impossible for one person to be skilled in all the areas in which competence is expected. The unusual spread in ability in many classrooms, coupled with increased enrollments and the great desire for quality education, makes other forms of organization and of addition or redistribution of staff almost a necessity.

Nongraded Classes

While a graded plan of organization is the prevailing type of organization in the elementary school today, a large number of schools have moved into a nongraded program, particularly in the primary grades. Others have extended nongraded classes through the sixth grade. Nongrading in junior and senior high schools is largely experimental. The trend toward nongrading, especially in the elementary school, appears to be growing rapidly. One large system in three is now using a nongraded sequence in at least some elementary schools.

There is increased awareness of differences in and among individuals and of concern in meeting the special problems of the gifted and slow learning pupils. "Organizationally," according to Goodlad—

> A nongraded school is one in which the grade levels and grade labels representing years of vertical progress are replaced by a plan of continuous upward progress. Conceptually, it is intended to eliminate the promotion—non-promotion adjustment of graded schools, to raise the ceilings and lower the floors of attainment expectancies for learners, thus encompassing their individual differences to encourage the utilization of content and materials in accordance with pupil individuality; and to force pedagogical attention to individual differences and the individual.[4]

Nongrading makes possible flexible groupings of many kinds.

There is wide variation in the development of children at the time they enter school. Some are able to meet grade expectations easily; others progress more slowly, but may actually blossom with a little more maturity. Nongrading takes the pressure off children. Teachers report there is a reduction in tension in slow learners and that there are fewer emotional problems and improved classroom behavior.

In the early school years children begin to develop a self-concept and may feel inferior, rejected, alienated, or a failure—especially if they are not promoted from one grade to the next. In the nongraded school, a child is allowed to progress at his own rate without the stigma of having failed. He continues at the beginning of each school year where he left off the year before.

Nongraded programs allow a child to have materials at his own level of development. He can be involved in significant, enjoyable learning experiences in which he can meet success. This fosters improved relationships and attitudes of mutual respect among children and between teachers and children. When a child remains with his peers and is liked by them and experiences success, he tends to like school and is, therefore, more likely to remain in school. Early school leaving often has its beginnings in the preschool years and the primary grades. Proponents of the nongraded plan of class organization believe that it adjusts to individual mental, emotional, physical, and social needs better than the graded system and reduces failures and frustrations.

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[4] Goodlad, John I. "Cooperative Teaching in Educational Reform." *National Elementary Principal* 14: 10; January 1965.

Multigraded Classes

Multigraded classes are a modification of the traditional elementary graded school in which classes are composed of students of several ages, abilities, interests, and grades. Unlike a nongraded plan, it operates within the framework of a graded system and retains grade levels. It is a vertical dimension of school organization based on the assumption that pupils are better off when they are grouped heterogeneously rather than homogeneously.

In a primary multigraded unit there are approximately an equal number of first-, second-, and third-grade children. An intermediate unit has an equal number of fourth, fifth, and sixth graders. Each year approximately one-third of the children move on to the next unit. This arrangement permits the child to be grouped across grade lines in subject matter and to advance at different speeds in various aspects of learning. It recognizes and provides for a wider range of abilities than the graded system.

There are comparatively few multigraded units in elementary schools, and research as to their effectiveness is limited. There is some indication that where this type of organization is tried, teachers, parents, and pupils are enthusiastic about it. Older children help the younger children and younger children learn from the older ones. Achievement in reading, arithmetic, and language is reported to be high. There may also be greater gains in personal adjustment, social adjustment, social maturity, and certain behavior characteristics. Pupil-pupil relationships within multigraded classes are similar to those in single grades.

Departmentalized Programs

Departmentalization of instruction has been characteristic of secondary schools for many years. In recent times, demand for excellence in education and emphasis on rational thinking has resulted in departmentalized programs in elementary schools. This has been especially true in the upper elementary grades, but in some instances departmentalization extends throughout the entire elementary school.

A teacher in a departmentalized program has contact with far more pupils than he does in a self-contained classroom; therefore, he is with the individual pupil a much shorter time and does not see him in all his relationships during the day. It is more difficult for the teacher to know and understand each pupil's needs in this situation. Departmentalization is unmistakably a plan fitted to a subject-centered school and requires a rigid schedule. The demands that the teacher be up-to-date and informed in depth on changing curriculums, such as the new mathematics and the new sciences, have encouraged specialization. The demands on the child have grown too and point up the need for increased attention to his physical and emotional health.

Cooperative Teaching

Cooperative teaching is a way of organizing the school horizontally; that is, of assigning pupils to teachers and classes. It may be as simple as two or more teachers, normally separated in self-contained classrooms, coming together for planning and teaching. Or it may be as complex as a hierarchy of personnel—coordinator, master teacher, regular teacher, intern, student teacher, aides, clerk —cooperatively planning for the needs of the pupils from many previously separated classes.

With cooperative, or team, teaching students may assemble in large groups (fifty to a hundred or more) to hear a lecture or view educational television; divide into small discussion groups; or individually explore in depth some topic of interest. Time is divided between large group and small group activities and individual study.

Classes To Meet Special Needs

At times special classes are organized to meet the special needs of particular pupils, such as the partially sighted, the gifted, the mentally retarded, and the emotionally disturbed. Pupils in such classes are encouraged to participate as fully as possible in general school programs, such as assemblies and field days, and to associate to as great an extent as possible with pupils who do not have these special needs.

Head Start programs are conducted during the summer for children from disadvantaged homes who will enter school in September. They have three purposes: (a) to give children the kind of experiences and opportunities that are lacking in some homes and that will help prepare them for school; (b) to provide medical and dental examinations and to arrange for such remedial help as is found necessary; and (c) to make needed social services available to children and their parents. Those involved in these programs claim that results have surpassed expectations.

Although Head Start is a community program, the centers are usually located in schools. Thousands of professional educators, in addition to volunteers, staff the centers.

Project Follow Through, an outgrowth of Head Start, was begun in 30 selected schools in the fall of 1967 under the direct administration of local school boards. Follow Through projects are designed to bring the benefits of Head Start into the regular school system by offering children in the latter program continued instructional help and also other assistance—medical, dental, psychological, and social. Children in a Head Start program may quickly lose the gains they have made, if given no further help.

Research Is Needed

What will be the effects of new types of school organization on pupil health? More evidence is needed than is now available. We are entering an era where more attention will be given to school organization patterns. Thoughtful consideration of contemplated changes will lead to an organization which will facilitate learning and at the same time protect and promote pupil health. However, no pattern of grouping or method of teaching can ever replace the warm, personal interest of a dedicated teacher.

SIZE OF CLASSES

Public school enrollment has been growing at the rate of more than a million pupils per year for the last decade, placing school administrators and school boards under pressure to build more classrooms and employ more teachers. Inability to keep pace in both of these efforts has led to renewed research to discover the best ways of utilizing the available staff in relation to the number of pupils to be taught. In some instances, class size has been increased beyond that which is desirable.

The Situation

Some school administrators are forced to assign teachers to classes of 30, 35, and sometimes 40 pupils; 170,585 elementary school pupils (kindergarten excluded) were denied more than a half-day session in 1965. The West has the highest percentage of school systems with half-day sessions. More than half of the elementary school children in 2,731 public school systems enrolling 3,000 or more pupils are in classes of more than 30 pupils each.

Classes are largest in the large cities and in the Southeast. In the Southeast almost 90,000 children are in classes of 46 or more pupils. If all pupils in these elementary school classes of more than 25 could be regrouped into classes of 25 each, the nation would need 118,629 additional classrooms and a like number of teachers.[5]

The larger the school system, the larger the classes in both junior high schools and high schools, according to a study completed in 1964.[6] For all the 351,020 junior high school classes combined, in 307 of the 433 largest public school systems reporting, the overall median class size is 30.6; 7.6 percent contain 41 or more pupils each. For all the 463,127 reporting high school classes combined, the median is 29.0; 6.9 percent having 41 or more students each.

The Results

Empirical evidence indicates that when classes are larger, individual attention to pupils decreases and regimentation increases. Loss of self-identity and depersonalization are sometimes experienced by pupils in large groups. Cooperative teaching, individualized instruction, and the use of teacher aides are among the measures taken to cope with excessively large classes.

THE TONE OF THE SCHOOL

Pupils in a classroom are often a heterogeneous group, completely unlike in socioeconomic background, culture, educational ability and achievement, and sometimes in language. Many middle-class pupils coming from homes with comparatively stable backgrounds are unaccustomed to slum children whose language, value system, and cognitive style are alien to them. Suburban children may be unfamiliar with the attitudes and practices of pupils from the highly mobile families of the inner city. All children and youth bring to school the attitudes, values, and language of their families and associates, and these may vary. The teacher, as well, may be unlike his pupils in color, background, and native language.

A Challenge

Profound and far-reaching changes in schools due to integration require compassionate understanding, great patience, keen insight, and love of all children on the part of the administrator and teacher. It is in individual classrooms that the divisive forces threatening this country can be most easily and surely checked. What a challenge to today's schools education and democracy are! It is here that democracy can be practiced. It begins by democratic attitudes and actions on the part of administrators and teachers. Their attitudes, practices, and values are reflected in the pupils and in the general atmosphere of the school.

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[5] National Education Association, Research Division. "Class Size in Elementary School." *Research Bulletin* 43: 106-109; December 1965.

[6] National Education Association, Research Division. "Class Size in Secondary Schools." *Research Bulletin* 43: 19-23; February 1965.

Schools that are democratically organized and conducted foster improved relationships and attitudes of mutual respect among all school personnel, between teachers and pupils, and among pupils themselves. Persistent effort is made to improve each individual's self-concept and enhance his sense of personal worth. Competent leadership helps draw together the diverse elements in the school into a unified whole, working together to accomplish common purposes. Only in this way can a favorable environment for living and learning be created.

Acceptance Is Important

The able administrator and his staff know that they must express to pupils the fact that they are respected and accepted. A pupil is quick to sense feelings of acceptance or of rejection. The way the school day begins helps to set the tone of the day; and the friendly smile, the individual greeting by name, the attractive, orderly, colorful classroom filled with interesting things for pupils to see, do, and read go a long way toward providing the right tone.

Every pupil, regardless of his socioeconomic condition, his cultural status, or the presence of a handicapping condition, needs to feel wanted. Acceptance is communicated to a pupil by what one says and how one says it, by the tone of voice and inflection, by facial expression, by gestures, and by the quality of one's smile. Is the school organized in such a way that new and different children are easily and quickly absorbed into the life of the school? Are situations and tasks provided in which pupils can succeed and experience some sense of achievement?

Regardless of background, circumstances, special health problems, or color, all children and youth possess common desires and feelings. All should be treated with respect and human dignity and made accepted members of the group. They are not responsible for the actions of adults. The hope of democratic institutions lies in children living daily in an environment where democracy is taught by living it.

Other considerations, too, affect significantly the atmosphere or tone of the school. Does the school operate according to the objective of helping each pupil make continual progress, or does it unduly stress marks and honors? Is an effort made to provide experience in relation to the ability of an individual or group, or are rigid standards and prescribed experiences the rule? Do mistakes in academic work or in behavior invariably call for punishment of some sort, or do they become opportunities for further analysis of problems and for growth in power to solve them? These are critical questions which require answers.

TRANSPORTATION FOR PUPILS

More then 10 million pupils, approximately one-third of those enrolled, are transported to school daily by bus at an annual cost of over $300,000,000. Most are children and youth who live too far from school to walk. Others may be handicapped so that walking is not possible. Attempts to correct conditions of racial imbalance have resulted in busing pupils between cities and surburban areas.

Health and Safety

Whenever pupils are transported to and from school, regardless of the reason, attention should be given to matters of health and safety. Naturally, the school administrator will make sure that the bus is maintained in proper condition, that the driver is competent and responsible, and that standards for conduct while riding in buses are formulated, discussed, and implemented with pupils.

The close association of pupils in a bus requires that precautions be taken to prevent the spread of communicable diseases. Pupils should be immunized against all diseases for which preventive measures are available. In addition, school policies should request parents to keep sick children at home.

Questions Needing Anwers

As a school bus program is organized questions will arise which can be answered only by representatives of the local community. These relate to the time of day that pupils get on the bus, the duration of the trip, and the time they return home. What are the effects of spending two hours a day riding on a bus? Could time consumed in bus riding be better employed? In case of emergency, sickness, or injury while on a bus, what action is recommended? If a pupil misses a school bus in an unfamiliar neighborhood, what procedure should he follow?

Attention to these questions and to other problems that may arise will enable schools to provide transportation that is safe and free of avoidable health hazards.

ADAPTING TO CHANGES IN SCHOOL ORGANIZATION

Changes in school organizational patterns have made teaching more complex and more demanding than in former years. They have resulted in increased use of allied personnel and created a need for new understandings and attitudes on the part of teachers and administrators.

Use of Allied Personnel

One procedure aiding adjustment to new conditions is the employment of allied workers, commonly called teacher aides. These persons relieve the teacher of numerous clerical tasks, help to assemble teaching materials, and, in many other ways, provide valuable assistance to the teacher. They have proved their worth in many communities.

Volunteers are used in school programs. Sometimes volunteers help in school health service activities. They may assist in vision screening, in looking after a sick or injured pupil, or in tabulating information regarding the immunization status of the school population.

The use of aides and volunteers requires careful consideration of many matters, some administrative in nature and others relating to health. The roles of such professional persons as teachers and nurses must be differentiated from those of nonprofessional persons, and the responsibilities of each group clearly stated. From the health point of view, aides, whether paid workers or volunteers, should meet the same health standards as other school employees. They should have pre-employment medical examinations and periodic examinations during the period of employment.

Transition from Old to New

Changes in school organization and procedures place tremendous demands on the time and energy of teachers. Even when given assistants, the teacher is faced with tasks of great magnitude and importance.

The school administrator helps teachers adopt new organizational features. He discusses with them contemplated innovations and the reasons for them. He serves as a catalyst by providing conditions which make it possible for teachers to try out new ideas without feeling threatened or frustrated. Moreover, he encourages and supports creativity and originality.

The most significant force acting toward the improvement of school organization is the attitude of teachers themselves. Like other sophisticated adults, teachers react favorably to constructive changes. Often a teacher is in the best position to see the need for change and to initiate it. Teachers who participate in a dynamic pattern of school organization are among the leaders in their profession.

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Chapter 3

The Emotional Setting of the Classroom

The emotional atmosphere or climate of classrooms in elementary and secondary schools is created primarily by the composite behavior and attitudes of the pupils and teachers who work together in those classrooms. Secondarily, the emotional climate is influenced by the behavior and attitudes of parents and by those who govern and administer the affairs of the town, county, state, and nation of which the students, their parents, and teachers are constituents. The attitudes and behavior of the community are reflected in the bricks and mortar provided for education, as well as by the economic and professional opportunities provided for the educators.

In this chapter emphasis will be directed toward that part of the psychological environment in the classroom that is established by teachers and their pupils, with comments on secondary factors as their significance becomes visible in the classroom.

VIEWPOINTS ON EMOTIONAL CLIMATE

In considering the emotional climate of the classroom there are guiding assumptions about the characteristics of a desirable learning and socializing atmosphere and the factors that contribute to it. These characteristics are influenced by psychological pressures that exist in classroom situations and produce responses in pupils that vary with their developmental level.

Success in resolving psychological pressures, achieved through application of established principles, can significantly improve the emotional tone of a classroom. Such results require action by both teachers and pupils.

Guiding Assumptions

The first assumption is that children and youth of all ages, from nursery school on, learn a significant amount from each other. Conditions that facilitate this collaboration in learning contribute to a healthy or desirable emotional climate in the classroom.

The second assumption is that children and youth of all ages learn most effectively, from the point of view of their own satisfaction and that of their teachers, if they are mentally active, rather than passive, in the learning situation. This requires that the pupil learn and exercise what he learns to a significant extent by actively relating his tools of learning and the content of his knowledge to our current environment and history. Thus, as he perceives, recites, learns, and practices, the pupil in a dynamic classroom environment will be able to relate the past to the present, actively discerning how what he learns is relevant to his life now. In this way the pupil's motivation to learn is sustained at a high level because his instruments of learning and his increased knowledge prepare him for the future and give him a rational sense of continuity with the past.

The third assumption is that the teacher's morale is a critical contributory factor in determining the emotional climate of the classroom. Morale is influenced by many factors, including evidence that the teacher can be effective, opportunities for professional growth, prestige in the community, and financial remuneration commensurate with the teacher's qualifications and responsibilities. As with pupils, teachers must have opportunities to relate their skills and aims to the children and youth whom they meet in the classroom. Their own professional satisfactions should be sufficient to enable them to put the pupils' needs and long-term goals ahead of their own immediate preferences. Thus, a teacher who feels emotionally, socially, and economically pleased with his career and conditions of work will better use his teaching skills in the service of pupils' learning needs.

In a sense all three assumptions can be condensed into the following formulation: Pupils and teachers will be able to form mutually satisfying and productive alliances in the classroom when each group has opportunities to influence significantly what is being learned and how it is being learned. For the teacher this implies that self-determination is a crucial condition of planning and implementing the curriculum. For the pupil it implies that he is sharply aware of the teacher as a unique adult who assists him in learning. Under these circumstances teaching is relatively silent, and learning is more evident. There should not be so much teaching that there is too little learning.

We assume that a suitable classroom for pupils and teachers has adequate space and light and that other physical conditions are conducive to health, comfort, mental concentration, communication, and group and individual activity. We also assume that the school building, grounds, and physical conditions reflect parental and community interest in educational experiences as continuing and universal influences on children and youth.

A major aim of education is to provide the student with tools of symbolic communication that enable him to acquire factual and conceptual knowledge that can substitute, where appropriate, for physical experience. In the larger sense, formal education also conveys the attitudes, understanding, and tools of learning from one generation to the next—the transmission of culture. This aim of education is designed to prepare each student to be able to live his own life in a constructive and socially productive manner, rather than to become a victim of his environment and its pressures. In short, classroom experiences should help the pupil learn how to live his life. In a healthful classroom climate the pupil will feel encouraged to explore and understand his environment, to clarify and resolve conflict, and to adapt to the classroom environment while reshaping it. Expressing oneself should always be balanced by self-discipline. The limitations of time and energy and the needs of others also aid in providing a reasonable framework for the society of the classroom.

Psychological Pressures

A particularly useful way of viewing the emotional climate of the classroom is to examine the psychological pressures it brings to bear upon the individual pupil and how these external pressures interact with his inner pressures. The pupil's stage of development, his cultural background and past experiences, and his parents' attitudes towards his school experiences will all influence and determine his own attitudes and inner pressures. However, the psychological pressures brought to bear upon the child in school and his responses to these influences should be considered in terms of educational aims.

The teacher's functions stem from society's expectation that the school will provide each child with learning opportunities and supervision appropriate to his developmental capacities and his social and cultural background. There are any number of ways in which the teacher's concern and knowledge about the child's family and cultural heritage can become an enriching and productive aspect of the classroom atmosphere. The miniature world of the classroom can stimulate and promote socialization, curiosity, and prideful respect for differences among the individual members of the classroom group.

The pupil deals with outside pressures to produce or conform and his own inner pressures to express himself, to seek, to probe, and to master. Among the child's most dynamic sources of power are his impulses, his drives, and his unfolding capacity to become a unique person who has borrowed from many models and yet retains his own individuality. As he demonstrates his resources and responds to the pressures of the classroom, the pupil helps to form the emotional climate of the classroom.

Sylvia Ashton-Warner in the introduction to her book, *Teacher,* quotes from her previous book, *Spinster,* to indicate her sense of the child's inner world and implies what may underlie the classroom atmosphere:

> What a dangerous activity reading is; teaching is. All this plastering on of foreign stuff. Why plaster on at all when there is so much inside already? So much locked in? If only I could get it out and use it as working material. And not dried out either. If I had a light enough touch it would just come out under its own volcanic power. And psychic power, I read in bed this morning, is greater than any other power in the world. What an exciting and frightening business it would be: even that which squeezes through now is amazing enough. In the safety of the world behind my eyes, where the inspector shade cannot see, I picture the infant room as one widening crater, loud with the sound of erupting creativity. Every subject somehow in a creative vent. What wonderful design of movement and mood! What lovely behaviour of silksack clouds!
>
> An organic design. A growing living changing design. The normal and healthful design. Unsentimental and merciless and shockingly beautiful.[1]

The inherent potentialities of each child, which good teaching should uncover, are poetically expressed in this quotation.

Responses of the Young Child

The young child is eruptible and direct in showing his colorful, pathetic, and humorous sides. He also caves in more suddenly than an older child when caught between the pressure of his own drives and intense feelings and the demand that he become a member of a civilized group of peers and take up the tools of communication, symbolic expression, and mental reflection. In the midst of this crucial transformation of volcanic energies, the young child may experience romantic love or fearful hatred for his teachers and others who constitute his new community. Many of us will remember the passionate daydreams of the early days of kindergarten and the first and second grades. "If only she will wait until I grow up, we can get married," said one little boy about his teacher. Such romantic love, displaced from the home, is the stuff of which passionate education is formed. It helps to provide an environment in which the child can socialize and become increasingly self-understanding.

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[1] Ashton-Warner, Sylvia. *Teacher.* New York: Simon & Schuster, 1963. p. 14.

However, though the love is unique, the learning performance may be average. This may lead to the conclusion on the part of parents and teacher that the child is underachieving. But is he underachieving? Should not, perhaps, the fault be assigned to the parents? The teachers? The child's society? His community? His culture? There are no ready answers—only those that are worked out after taking account of the uniqueness of each child working together with his teacher and his parents. The classroom atmosphere reflects the child's self-esteem, as well as the self-esteem of the group, the teacher, and the parents.

In a "Peanuts" cartoon strip Lucy says to Charlie Brown, "You got a C in History; that's only average." Charlie Brown retorts, "So what, I'm an average student in an average school in an average community." And then he adds, "What's wrong with being average?" Lucy, hoping to have the last word, replies, "You're capable of doing much better." For a change, Charlie gets the last word: "That's the average answer." [2] In the classroom the values given to grades, to belonging to the group, and to competition and cooperation are essential features of the emotional setting of the classroom.

The teacher's attitudes toward rivalry among pupils and his use of assessment and grading to indicate his approval or disapproval of a pupil's work and of a group's work are further components of the classroom atmosphere. Parents, indirectly, often exert an enormous influence on the emotional climate of the classroom through their overvaluation or undervaluation of their children's performance and utilization of the educational experience. Parents also may find it difficult to use in a positive and realistic way their children's relationship to the teacher and to peers.

How the Older Child Reacts

The older child, with increasingly independent ways of acquiring basic skills and knowledge and a growing allegiance to his peer group, is not nearly so vulnerable to his own impulsive reactions and energies. Though he may yield to and depend upon the pressures of his peer group, his own conscience is relatively well-developed, even if unstable and often too strict. The basic skills of reading, writing, and reciting are by now well-established. In junior high school he begins to hear about the work market or college, about the fearful consequences of not being in the right group or of being caught in a track from which he can't escape.

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[2] Schulz, Charles. *Peanuts.* United Features Syndicate, 1965.

The world about him exhorts him to follow the laudable ideal of "Peace on Earth, Goodwill to Men," while this same world demonstrates a glaring discrepancy between what it professes and what it permits or encourages. The environmental and internal pressures increase. The widening functions of school include special clubs, civic or community projects, and the acquisition of musical, artistic, and many technical skills. The peer group increasingly guides the individual during the busy school week and weekend. Thus, the emotional setting becomes more complex and more closely related to the psychological climate of the community.

Adults fear that if they don't demand or coax students will not participate in these less formal aspects of the school program, let alone initiate or organize such activities. Parents and teachers hope that students will develop pride and a sense of responsibility for their school, but the adults feel threatened if children become too assertive, too critical, or too independent.

In the classroom and in the school as a whole the emotional setting should be responsive to the uniqueness of the particular community. The right distance must be maintained between too much pressure and too little pressure, between an easy conformity and an inflexible nonconformity. A school environment should provide opportunities for choices from among a large number of viable alternatives to enable the child to be his own person and yet to retain the richness and pride of his own cultural heritage.

The adolescent has a particular need to be active in showing us the way to a brave new world. And yet the adolescent's approach has to represent his way of gaining some distance from his parents and other adults without closing off the return road to a new relationship with his parents—a form of comradeship in which mutual respect is an essential feature. The adolescent's line of development should enable him to explore, experiment, rebel, and march forward in order to have time to seek and find himself and his world anew. It is true that a local election today would not permit our junior or senior high school students to vote, but they should "own" part of their school and their community. If they are to help us find the right distance between the choices mentioned above, they should have a setting which offers opportunities to form collaborative alliances with their instructors, as well as with their peers.

Some Generalizations

Educators—and the school—can help contribute to the establishment of a setting in which teachers and students can jointly exploit and resolve the inevitable pressures of a school community in the service of sound learning and balanced personality development. As we formulate principles to summarize our understanding of this process, we should keep in mind the following generalizations about the emotional setting of a classroom:

1. The inner or developmental pressures and drives of the pupil and the pressures that stem from the environment are dynamic and subject to a variety of influences.
2. The family, the basis of our culture, is a changing, developing social unit.
3. The world is changing with increasing rapidity. Our communities reflect the impact of the realities and uncertainties of nuclear energy, space exploration, rapid transportation and communication. There is an urgent need to find the constructive or safe distance between self-expression and self-control.
4. A school without conflict is neither possible nor desirable, since the student is able to achieve understanding and mastery only by facing and working through his conflicts. (If there's no heat, there'll be no light!)
5. As the family and school personnel have their limitations, so has the student. An essential function of education is to help the student define and cope with his limitations as well as his assets.
6. There are inevitable discrepancies between what a pupil achieves and what he, his family, his instructors, and his peers expect of him. What is crucial is not these discrepancies, but rather their degree and characteristics and the resources that the pupil develops in coming to grips with them.
7. Finally, pupils learn from each other as well as from the teacher. This truth give rise to the aphorism, "When there's too much teaching being done, there may not be enough learning."

The above generalizations can guide school personnel in preventing or resolving psychological pressures within the classroom, thus helping to preserve a healthful emotional environment.

DEVELOPING A DESIRABLE EMOTIONAL SETTING

Many factors and many persons influence the emotional setting of the classroom. Among these are the interpersonal relationships between the teacher and his pupils, the degree to which children and youth participate in classroom planning, the effectiveness of parent and teacher efforts to help pupils develop self-esteem, and the ability of school personnel to adapt programs to the needs of individual pupils.

In assisting pupils to shape and use their educational environment, school personnel must constantly and critically consider each of the above factors and their effect on the attitudes, behavior, and learning abilities of pupils. Such attention should be a continuous process reflecting teachers' and pupils' evaluations and aspirations.

Empathy Is Essential

Each teacher faces the dilemma of how to empathize with his pupils, while at the same time offering himself as a guiding adult model. The classroom can become disorganized and interfere with the student's efforts to organize his thinking when the teacher, in an effort to empathize, regresses to the level of his pupils. At the other extreme is the teacher who remains too stiff, aloof, and formalistic. The most productive educational environment is one in which the teacher and pupils are able to identify in part with each other in order to communicate more effectively and with greater satisfaction.

This issue has been discussed in a wide variety of publications which have focused on our national concern about the educational retardation of children reared and attending school in slum neighborhoods.[3] Here empathy and identification is further complicated by differences in the backgrounds of teachers and pupils and their parents. It is essential that the teacher learn to understand his pupils and their backgrounds in order to set up conditions which promote productive teacher-pupil alliances, enabling the teacher to exert an organizing and regulating influence on the pupil and his behavior.

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[3] Fantini, M. D., and Weinstein, G. *The Disadvantaged: Challenge to Education.* New York: Harper & Row, 1968.

Kozol, Jonathan. *Death at an Early Age.* Boston: Houghton Mifflin Co., 1967.

Holt, John. *How Children Learn.* New York: Pitman Publishing Corp. 1967.

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If the teacher does not understand the child, cannot empathize with him, and cannot put himself in the pupil's shoes, then the alliance necessary to promote teaching and learning will not evolve. On the other hand, there is a risk that the teacher will regress to the level of the child or youth. This dilemma is one feature of the educator's work that makes each day so exhausting and so challenging. The teacher has to allow himself to regress a little in order to understand how the student prefers to learn. Of course, the age of the child, as well as his characteristic ways of learning, determine the degree and kind of pressure and stimulation that the teaching process demands. The relationships that result help to create the classroom atmosphere.

Although the teacher may have 25 or 30 children in his classroom, he gradually makes a silent and unique arrangement with each one. As the school year progresses, these unique arrangements should allow him to establish alliances that enable pupils to learn individually and also as members of a class group. The alliance results in a growing awareness on the part of the pupil of a sense of pride and responsibility for his teacher and his class. Likewise, the teacher becomes increasingly aware of and develops a sense of pride and responsiblity for the uniqueness of each pupil and of his class as a group. The parents, through their active interest and participation in the lives of their children and their school, also achieve involvement and pride. The classroom atmosphere reflects these dynamic, interpersonal relationships and the degree to which they are developing.

Pupils Share Responsibilities

In the interests of a productive psychological environment, teachers should invite and encourage pupils to share in classroom procedures. In this way pupils can channel pressures originating within themselves and those stemming from their family and school experiences into increasing their capacities to learn, to cope, to become more independent, and to find the right balance between conformity and nonconformity.

How do pupils influence the school atmosphere? The answer comes from considering their developmental characteristics and tasks. Obviously the elementary school child is going to relate to the school somewhat differently from the high school student. The major commitment of the young child is at home, rather than at school. Perhaps his primary task is to achieve separation from home and to begin a relationship in school which will enable him to become active and influential in the school community.

As the child grows older, he gradually realizes that to find satisfaction at school he has to acquire the tools that the school provides for him to express himself and exert his influence. Therefore, as he moves through the elementary grades his ability to use the symbolic expressions inherent in reading, writing, and recitation and to apply mathematical language and concepts will become the means through which he asserts many of his interests in and expectations from the school situation.

Pupils form many different groups. Groups begin to form in kindergarten and take increasingly firm shape in each succeeding grade. The assertive involvement of the group reaches a new height at the beginning of junior high school, when student groups often tell the teacher what they want and what they think they should have. Although not quite old enough to have that authority, they may have developed a variety of ways of attempting to assert their aims and wishes, of shaping and changing the classroom and school settings.

Assuming that formal learning is proceeding at the expected pace, the peer group now begins to be a primary interest, psychologically and socially. Evidence of the teen-ager's interest in school may become manifest through many peer group activities, both within the school curriculum and in extracurricular settings. This is seen in pride in class performance, self-government, athletics, and cultural or special skill clubs. Ideally, the school climate promotes learning and socialization in a relatively balanced manner.

The degree to which students express pride in their school and the degree to which they feel they can fruitfully influence their school is a reflection of how well the social, educational, and physical aspects of the school environment and the school community are being exploited.

As this intellectual, social, and emotional involvement in school takes place, students pay greater attention to the rules of the complex school community life. They seem to ask, How can one get along? From whom can one expect what? And what can one share with his peers which can no longer be shared with adults? The manner in which these questions can be raised and confronted forms a critical aspect of the school's emotional setting.

Of course, the adolescent makes his own contribution to this setting. How do teachers' attitudes and practices help him? How is he enabled to use his own biological and psychological pressures and the pressures created by the demands and opportunities of the school to further his learning and his search for the adult he will become? This question can be paraphrased: How does the school enable the adolescent to acquire an active and appropriate voice in the affairs of his school community?

In high school the student begins to think of achievement in the context of a permanent pattern for himself. He becomes aware of the expectation from himself and others that the capacities to form human relationships and to work may forecast his own future patterns of work and human relationships. As the expectation of industriousness and of long-term personal relationships with peers of the same sex and opposite sex develops, there also emerges the expectation of dependability. One can gradually know what each person or group represents, and others can know what one stands for along certain lines.

This is a prolonged, dynamic process often changing in spectacular and dramatic fashion as the adolescent explores, experiments. and tries new ways to get along. An underlying assumption of the process is that there will emerge an adult whose work and personal relations can be considered characteristic for that person.

Parent and Teacher Influences

Meanwhile, what is going on at home that influences the school setting? What are the needs of the parents, the family? They have to reconcile their aspirations for their children with their perception of how their offspring are developing in the school and the community. Parents also have to cope with the fact that they are losing a little child and acquiring an individual who is unique but, at the same time, reminds them of themselves—sometimes reproachfully. In what ways does the school setting respond to these parental contributions?

Self-esteem is a human feeling that powerfully contributes to a social setting. The nature of the student's development and school achievement alters and influences the family self-esteem. This is reflected in the relationships between the parents and faculty, between the parents and their children, and between the teachers and students, and these relationships are a dynamic and powerful aspect of the school setting.

For the school faculty and administration, self-esteem and morale are inextricably interwoven, operating as a negative force when educators feel overworked and underpaid. If their social status is one which they feel downgrades their self-esteem, their pride and motivation will be jeopardized. How can the students reach a level of accurate, therefore healthy, self-esteem if the teacher's self-esteem is distorted? Distortions of self-esteem in the teacher or in the student create an unhealthy climate in the school community. This brings up certain basic considerations. The ratio of teachers to students, salaries, opportunities for advancement, and a sense of being valued are among the most obviously important factors affecting an educator's self-esteem.

Tailoring to Individual Needs

Beliefs about conformity and nonconformity are dramatized and demonstrated by the degree to which the teacher tailors the curriculum and learning experiences to the needs of individual pupils. Obviously, such adaptation is limited and is utilized when the pupil indicates he is overwhelmed by those pressures in the environment that other children use to advance their learning and mastery. Most learning is accomplished somewhat silently, without tailoring, with the pupil as a member of a group. The group learns and communicates together and uses the teacher as an instrument for learning in a classroom setting that directly and indirectly reflects these alliances and a mutuality of interest and involvement.

At school the atmosphere should enable children and youth to become involved in socialization, whether it be learning together, planning together, or utilizing opportunities for self-direction that lead to the practice of personal responsibility. Certainly those attitudes and conditions which promote understanding and tolerance for exploration and experimentation are the same that promote the many productive alliances that teachers and pupils can form.

The Critical Factors

The convergence of teachers' and students' needs as reflected in the classroom atmosphere becomes visible in such characteristics as the number of children in a classroom, the similarity and dissimilarity of the socioeconomic and cultural backgrounds of the children, and the resources available to the teacher to facilitate his effectiveness in promoting the cognitive and social learning of all the children in his classroom.

The following are the most critical needs involved in establishing a productive and sound emotional climate in the classroom and in the school community:

1. An environment which can be manipulated to enable the pupil and teacher to know each other, increasingly, as unique individuals
2. Relationships that satisfy the pupil's need to *feel* understood, respected, and encouraged in his quest for knowledge and independence
3. Balance in the educational program between preplanned, structured, sequential activities and informal and self-expressive activities
4. Cognitive, aesthetic, and physical stimulation and exercise adapted to particular subcultures in the classroom (This implies the need for an atmosphere of pleasurable learning that gradually enables the pupil to tolerate the frustration inevitable in later, more complex study activity.)
5. An atmosphere in which the pupil knows that he can learn and can achieve and progress academically; that he can adequately and appropriately influence his environment; and that he can express himself openly, clearly, forcefully, and with satisfaction—particularly through language
6. An atmosphere which provides the student a sense of the group to which he belongs in school, as well as a sense of community with all adults, children, and youth (This implies the advantage of heterogeneity in establishing classroom groups.)
7. A sense of continuity between the home and the school and between the previous year and the next, through teachers, classmates, and common experiences and living space
8. The participation of one's own and one's classmates' parents in the school life, so that all may become increasingly familiar with each other's cultural backgrounds and traditions
9. An atmosphere in which individual rights are understood and respected.

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Chapter 4

School Housekeeping and the Physical Environment

All who have read *The Legend of Sleepy Hollow* will recall the delightful home of old Baltus Van Tassel. Order, good management, cleanliness, and plenty were carefully blended into an overall homey atmosphere that was as pleasing to the lanky itinerant schoolmaster as to the buxom Katrina. This atmosphere pervaded everything that was done in and around the home.

The freshly scrubbed, sweet-smelling floors of wide oak puncheons in the spacious farmhouse, the brightly burnished pewter and brass on the shelf, the gleaming silver and old china peeping through the half-open door of a corner cupboard, and the polished andirons with matching tongs and shovel standing nearby reflected the pride and the skillful touch of the good housekeeper.

The essence of good housekeeping, whether it be in a home, a school, or anywhere else, is the maintenance of a climate favorable to clean, wholesome, pleasant living with effective and efficient use of the resources needed and at hand. While there are many specific duties that must be performed, good housekeeping in the school, as in the home, cannot be regarded merely as a special service tacked on at appropriate times. Just as in the memorable Dutch household in the sleepy vale near Tarrytown, good housekeeping is an integral part of the pattern of daily living. It involves everybody in and around the school: superintendent, teachers, pupils, cafeteria workers, bus drivers, engineers, and, of course, custodians. It involves the arrangement of classroom furniture, the care of walls and floors, the use of books and equipment, and the utilization of toilet facilities and general purpose areas.

Good housekeeping extends outside the schoolhouse to the driveways, parking places, lawns, shrubbery, and play areas. It is affected by the attitudes and habits of pupils, teachers, and other school employees. And whether intentional or otherwise, housekeeping is intricately tied into instructional methods and into the very purpose of the school itself.

The task of keeping school buildings, classrooms, and supporting areas in a usable condition from the standpoints of both maintenance and day-to-day operation is a challenging responsibility affecting the health, safety, comfort, and well-being of all people who occupy or use school facilities, for whatever purpose. It involves the employment, training, supervision, and management of thousands of skilled and semiskilled workers, the selection and purchase of equipment, supplies, materials, and services that account for about 10 percent of the total annual school expenditures for current operations. The annual cost of maintaining and operating public elementary and secondary school buildings in recent years has totalled more than $2.6 billion, of which more than $1.6 billion was allocated to plant operation.

Elements of plant operation that are involved with school housekeeping and physical environment are discussed in this chapter. As used here, the term *housekeeping* means the care and management of school property and the provision of equipment and services at this property; environment is the aggregate of all external conditions and influences at a school facility that affect the life and development of those who occupy or use the facility. Under these definitions the main elements of plant operation relating to housekeeping and environment can be categorized as (a) cleaning and sanitation, (b) safety, (c) comfort and well-being, and (d) pest control.

CLEANING AND SANITATION

The terms *cleaning* and *sanitation* are often used interchangeably, but in truth the latter can prevail only if and when the former has been done. Cleaning is concerned with removing dirt or pollution, freeing from contamination or disease, removing impurities or extraneous matter. Sanitation is concerned with the promotion of hygiene and the prevention of disease. Cleaning is a physical function; sanitation is achieved partly as a result of this function.

Five types of physical activities usually associated with cleaning are dusting, sweeping, mopping, washing, and disinfecting.

Dusting

Air pollution is a much discussed subject these days, a problem about which health authorities have been concerned for many years. With the concentration of the nation's population in relatively small urban areas where there is also a concentration of factories, gasoline or oil-powered automotive equipment, and heavy traffic on the streets and highways, the problem has become more acute.

A certain amount of dust is in the atmosphere at all times and is moved from place to place, sometimes over great distances. With the intensification of activities that pollute the atmosphere with massive quantities of dust, there is an added health hazard for children in schools everywhere, especially in large cities. This danger is illustrated by the results of an analysis of dust taken from the window ledges of buildings in large cities. The analysis revealed that the dust contained ashes, sand, excreta of animals, plaster, soot, brick dust, clothing fibers, hair, steel, and microorganisms.[1]

From the standpoints of health and aesthetics, dusting is as essential to sanitation as either of the remaining four types of physical activities involved in cleaning. Classroom items requiring daily dusting, which should be done before school opens in the morning to remove dust deposits resulting from sweeping the previous afternoon and from normal atmospheric deposits during the night, are furniture of all kinds, baseboards, chalkboard trim and rails, window ledges, shelving, lockers or wardrobes, and other items having horizontal surfaces. Classroom walls and ceilings, as well as other wall and ceiling surfaces, should be dusted regularly as needed, but generally less often than furniture and similar items. Heating and ventilating outlets and appliances should be cleaned of dust as needed, perhaps once a week.

Offices, conference rooms, health suites, libraries, dining rooms, teachers' lounges, and other building areas that are used daily should be dusted daily in the same meticulous manner as classrooms.

Corridor baseboards, door trim, lockers, balustrades, transoms, breeze windows, mouldings, pictures, trophy cases, and bulletin boards may require daily or weekly dusting, depending on local conditions.

The only satisfactory dusting technique is to *pick up* and *remove* the dust. This can be accomplished when appropriate tools, supplies, and equipment are provided and used. These include power vacuum cleaners with appropriate attachments for the jobs to be done; chemically-treated dusters, dust mops, and soft, clean dust cloths; long-handled wall brushes with soft hair, nylon, or lamb's wool; a corn broom covered with a soft, clean cloth; a supply of an approved cleaning-dusting wax, chemical, or other preparation, preferably under pressure to facilitate spraying of cloths, mops, and brushes to enable them to pick up and retain dust. These items should be kept clean and the equipment in good working order, and all should be stored with care when not in use.

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[1] Leffler, W. S. "Practical Approach to Sweeping and Dusting." *School Management* 18: 51; September 1958.

Sweeping

Perhaps no duty of the school custodian is more important to maintaining clean, sanitary buildings than sweeping and dusting. Floors, carpeting, stair treads, ramps, landings, thresholds, and other building elements that are subjected to foot traffic are affected by dirt carried into a building on children's feet, as well as by a surprising amount of dust that infiltrates the premises via the atmosphere.

Areas of the school plant subjected to heavy traffic, such as entrances, stairs, corridors, ramps, and lobbies, may need to be swept at least twice daily—after the arrival of children in the morning and after their dismissal in the afternoon. If playgrounds are utilized appreciably by children during the day, entrances and corridors used by them on reentering the building may need to be swept after each group of children reenters the building. Building areas in which much physical activity is carried on, such as gymnasiums and shops, may require more frequent sweeping, depending on the type of activity and the accumulation of dust, dirt, and litter as a result of the activity. Classrooms and other areas having normal use should be swept once daily, more often if children move in and out of the building, carrying in additional dirt on each occasion.

Opinions differ as to the most satisfactory time to sweep building areas that require sweeping once each day. Some authorities hold that the best time to sweep these areas is two or three hours before they are to be used each morning; others prefer to have them swept soon after dismissal each day, thus allowing time for effective dusting the following morning.

For efficient, effective sweeping, it is essential that custodians have appropriate tools, supplies, equipment, and adequate storage space for them at appropriate locations. A central vacuum system is considered the most efficient sweeping tool. Next to the central system in effectiveness is the portable wet-dry vacuum which can be used for both sweeping (dirt and dust pick-up) and drying floors (water pick-up) after mopping.

The vacuum method is the only satisfactory way of providing day-to-day care of most carpeting in schools. Experiments have demonstrated that an efficient vacuum cleaner removes 57 percent more dirt than can be removed with the best floor brush. If floor brushes are used, however, they should be of the right size and type for each sweeping job. Their bristles should be of good grade, kept clean, and never stored in such a way that the bristles themselves will be damaged by the weight of the brush resting on them.

When cotton mops are used for dry sweeping, they are usually treated with a chemical that will cause dirt and dust particles to cling to them, to be disposed of by vigorously shaking the mops outside the buildings. These mops soon become clogged with dirt, despite frequent shaking, and must then be cleaned by washing them in a solution that will dissolve both the chemical with which they have been treated and the dirt held by them.

Mopping

Damp mopping or the more intensive treatment of scrubbing floors, generally interim operations between floor refinishing jobs, is necessary when floors become too soiled to be cleaned in the regular manner. There is no established frequency pattern for cleaning by mopping or scrubbing, but for the sake of pupils' health it must be done as needed, whether daily, weekly, monthly, or at other intervals.

Damp mopping is usually performed by applying small quantities of a mixture of warm (not hot) water and a mild detergent to the floor, using a long-fibered cotton mop. When the dirt or other deposit is dissolved, the same type mop, or a wet vacuum pick-up, may be used to remove the water and dissolved soil particles from the floor.

Scrubbing, a more intensive cleaning procedure than mopping, may be done by hand, using a deck scrub brush equipped with a long handle or a hand brush which makes it necessary for a worker to be on his hands and knees; or the work may be done with an electric scrubbing-buffing machine. Each method has a place when all floor surfaces of the total school plant have to be scrubbed. For example, stair treads and corners of rooms can be scrubbed more satisfactorily by hand than by machine. The machine not only does a better job of scrubbing large areas than scrubbing by hand, but saves enough man hours to pay for itself in a year or so. A wet vacuum pick-up, like the scrubbing machine, will do a better job of removing moisture and residue from scrubbed floors than the cotton strand, pick-up mop, or squeegee, and will do it more economically.

Certain types of flooring, such as asphalt tile, rubber tile, vinyl tile, and linoleum, are commonly waxed after cleaning. Nonskid wax should be used and applied carefully so that excessive amounts will not remain on the floor and cause it to become dangerously slippery.

This discussion does not deal with techniques and procedures for caring for each of the great variety of flooring materials, but a word of caution is that the manufacturer's recommendations should be followed without fail. These recommendations will prevent costly mistakes, ensure better cleaning, and produce more beautiful floors.

Washing

Among the more important elements of the school plant that require washing for cleanliness are glass, light fixtures, shades and blinds, chalk boards, walls and ceilings, and drinking fountains. Toilet rooms and fixtures, cafeterias, and shower and locker rooms need special attention.

Glass is used in many places and for many purposes in school buildings. A reasonably high standard of cleanliness in window glass requires at least monthly washing inside and out; door glass, particularly in main entrance doors and in entrance and partition panels, may require daily cleaning with a damp cloth. Glass portions of cabinets and display cases may also require daily cleaning with a damp cloth to remove fingerprints, dust, and atmospheric deposits. Mirrors, clock faces, and glass desk tops may be cleaned at less frequent intervals.

Light fixtures with glass or plastic panels and diffusers, as well as all-metal fixtures, must be washed periodically, perhaps once each month in localities where atmospheric conditions are bad, if satisfactory standards of illumination are to be maintained. Studies have shown that half the investment in lighting design, equipment, and electric energy consumed may be wasted if these fixtures are not properly maintained.[2] This means that, without such maintenance, 50 percent of the illumination produced and 50 percent of the electricity consumed are of no value in meeting the visual requirements of schoolchildren and teachers.

Custodians responsible for washing light fixtures should be instructed to render each luminaire shock-free before washing. Plastic parts should be allowed to air dry to obviate the possibility of an electrostatic charge when dried with a cloth or chamois—a charge that attracts and holds dirt.

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[2] Tonigan, Richard F. "Lighting Maintenance." *Nation's Schools* 66: 97-98; September 1960.

Shades and blinds are used to regulate natural light entering classrooms through windows, domes, or skylights. Uncontrolled sunlight may fall on pupils' desks, shine in their eyes, or be reflected from walls and furniture, thus interfering with vision. In most sections of the country both shades and venetian blinds will need to be vacuum cleaned every six to eight weeks. Blinds may need to be thoroughly washed once each year; shades dry cleaned or washed once every two or three years. Draw curtains, stage curtains, and drapes usually require similar treatment.

Chalkboards are valuable teaching aids only if material written on them can be seen without glare or distortion from all parts of the room. Clean surfaces ensure greater visibility of such written material. Washing is one way to clean these surfaces, but only if boards are made of materials that withstand water. Manufacturers' recommendations should be followed to prevent damage to board surfaces. The frequency with which chalkboards are cleaned, whatever the method, will depend on the type of chalk used, extent of use, and day-to-day care accorded them, but under average conditions, weekly washing should be sufficient.

Walls and ceilings play an important part in promoting visual comfort of pupils. This is due to their reflectance of light, both natural and artificial. When their surfaces are coated with dust, their reflectance factor is measurably decreased. Dust and dirt can be removed by washing, usually once each year unless atmospheric conditions make more frequent washing necessary. Painting ceiling and wall surfaces to improve their reflectance is usually done once each four or five years.

Machines for washing walls and ceilings are available, but most school systems still rely on the hand method of washing and rinsing. Whatever the method, however, it is important to use cleaning powders or detergents that are known to perform satisfactorily on the type of surface to be cleaned, since some wall and ceiling materials can be damaged by harsh cleaning materials. For these, another method such as sponging or wiping with a chemically treated sponge or chamois cloth is recommended.

Drinking fountains that are not properly adjusted and thoroughly cleaned at frequent intervals can transmit disease germs, through contact with the mouthpiece, from one person to another. It is important that water pressure be controlled so that the stream from the jet is high enough to permit children to drink without touching the mouthpiece. Moreover, it should be recognized that young children need to be taught how to use the fountains and how they can help to keep them clean.

Drinking fountains usually catch and hold more than their share of atmospheric dust due to their moist surfaces. Some children are not as careful about maintaining clean, sanitary fountains as public health standards require. Because of natural dust deposits and of student carelessness, drinking fountains should be inspected several times each day, and if any inspection reveals the need for cleaning, they should be washed with a brush, using a small amount of soap and water, or a small amount of nonabrasive cleaning powder. They should then be rinsed with clear water from the tap and polished with a soft dry cloth.

Toilet rooms and fixtures often are the source of foul odors. Components of toilet rooms that require washing are walls, floors, partitions, stalls or compartments, doors, and windows. Toilet room fixtures that require special care to keep them sanitary are water closets, urinals, lavoratories, and paper towel, soap, and sanitary napkin dispensers.

Toilet room walls should be cleaned two or three times a year. Generally toilet wall surfaces up to a height of about 5 or 6 feet are ceramic tile which can be satisfactorily cleaned by washing with soap and water. Concrete walls that have been painted can also be washed with soap and water. In some instances marble has been used as wainscoting for toilet room walls, partitions, and stalls. This material can also be washed with water and a mild detergent or soap and then rinsed.

Toilet room partitions, whether free-standing between urinals and water closets or joined together as compartments or stalls for privacy, are often fabricated from metal, which may be porcelainized, bonderized, enameled, or painted. Stone partitions and compartments are usually constructed of marble, slate, or some other type of impervious stone, all of which can be washed with mild soap or detergent and water.

Doors, and especially door knobs, handles, or pulls, can be instrumental in transmitting germs from one person to another. The doors themselves and their casings and trim should be cleaned with the same frequency as toilet room walls. Door hardware that comes in contact with hands should be cleaned daily.

Toilet room windows should be cleaned inside about once a month; on the outside, they should be cleaned about once each two or three months.

Toilet room floors can be kept clean and sanitary only if they are of an impervious material. Those that are not impervious will absorb human waste dropped or spilled on them and no amount of scrubbing or cleaning will eliminate odors emitted by them. Daily washing, using a stiff brush with soap and water, generally will remove most types of soil deposited on impervious floors.

Cracked or pitted toilet seats cannot be kept clean and therefore should be replaced. All toilet seats should be washed with hot water and neutral cleaner at least daily. They should then be rinsed thoroughly, wiped dry, with both seats and covers (if covers are used) left in an upright position to facilitate complete drying. Parts of the water closet that need special attention because they may harbor dirt and bacteria are seat hinges, floor bolts, flush handles, and the area under the flush rims of bowls.

All of the outside of the toilet bowl—front, side, rear—as well as the inside should be thoroughly washed daily. "Hit or miss" cleaning techniques always "miss" the outside back of the bowl. Such techniques should not be permitted. The underside of the flush rim of the bowl is often neglected, or superficially cleaned, when the bowl is washed. Most generally this area is the point of deposit for urinal salts, and when it is not thoroughly cleaned at frequent intervals with a special brush, it is usually the source of foul odor.

Urinals that are not thoroughly washed and rinsed each day can also be the source of annoying odors. Deodorant blocks, sometimes used in urinals, simply substitute one odor for another; they do not remove the cause. Only a thorough daily washing with brush and soap can remove the cause, and thus improve toilet room sanitation.

Lavatories are almost always located in toilet rooms, even though some may be located elsewhere in the building. They should be washed with soap, rinsed, and dried at least once daily, more often if they are used extensively.

Dispensers of all kinds—for toilet paper, soap, paper towels, and sanitary napkins—should be checked once or twice each day and refilled as needed. Elements of these fixtures that come in contact with user's hands should be kept sanitary by washing them at least daily with soap and water. When these dispensers are refilled or serviced, they should be inspected to determine their working condition and to discover whether or not they have been abused, tampered with, or damaged.

Washroom mirrors for grooming and glass shelving for temporary storage of books, purses, or other personal belongings should be damp cleaned and dried at least daily.

School cafeterias, for the purposes of this discussion, include all building areas that are used in storing, preparing, and serving food and for dining. Special areas and features of the school plant that support the primary functions of school cafeterias, such as entrances and exits, window openings, toilet rooms for lunchroom employees, dressing rooms, office areas, and storage space for garbage cans, are also within limits for this discussion. All such areas and special features relating to school cafeterias are generally assigned to regular school custodians, maids, or personnel other than lunchroom employees for cleaning. Lunchroom employees are usually held responsible for the sanitary condition of dishes, glasses, silver, cooking and baking utensils, storage space for these items, stoves, ovens, appliances, and refrigerators. (Sanitation relating to school kitchens and dining rooms is discussed in Chapter 7.)

Floors of kitchens, serving areas, and dining room entrances should be wet mopped with soap (or a satisfactory detergent) mixed with water and then rinsed after each day's use. Unless pupils have been very careless about the handling of food in the dining room, a daily sweeping or dry mopping of dining room floors, with wet mopping twice a week and a thorough scrubbing once a month, should ensure sanitary conditions for the dining room floor. This is based on the assumption that dining room floors are covered with asphalt or vinyl tile or linoleum or are constructed of terrazzo, concrete, or other washable material. Carpeted dining room floors can be kept clean by vacuuming, but an occasional shampooing of the carpet will be required. Special attention may be needed to remove spots that seem unusually deep-seated.

Doors and windows of the food service area will require more frequent washings than are required for these components in other parts of the building. This is due to the fact that, even with exhaust hoods over cooking surfaces, kitchens discharge much moisture into the air. This moisture picks up airborne dust, and the dust-laden moisture is eventually deposited on exposed surfaces, including windows and doors.

Windows and doors in the food service area should be screened. The door screens should be checked regularly to determine if they have been torn or damaged and to ascertain whether or not their closers are operating satisfactorily. If screen door closers are not functioning properly or if the wire mesh is torn, flies and other germ-carrying insects can enter to contaminate any exposed food, dishes, silverware, utensils, and other equipment used in preparing and serving food. Screens and closers should be kept in repair and should perform their intended functions.

Toilet facilities adjacent to, but not opening into, kitchens or dining areas should be provided for food service employees. Floors, doors, walls, stalls, and fixtures should be kept immaculately clean. The lavatory (or lavatories) for food service employees should be located in toilet rooms so that they are near the exit door and at locations convenient to workers in the kitchen. Signs stating that employees using the toilet room must wash their hands before returning to duty should be posted on or near the exit door. Foot controls for wash basins are desirable. All fixtures (water closets and their components, lavatories and valve handles, and dispensers) in toilet rooms used by lunchroom employees should be thoroughly cleaned each day, preferably at the close of the school day.

Floors of dressing rooms for food service employees and offices of lunchroom managers should be dry or wet mopped as required, waxed and polished when needed, and the furniture and equipment in these areas should be dusted, preferably by vacuuming, every day. There is a tendency in some school districts to overlook the importance of cleanliness and sanitation in dressing rooms for lunchroom employees. Since this is the point at which these employees prepare themselves for their daily responsibilities, it seems obvious that the condition of their dressing rooms will directly affect their standards in personal hygiene and attitudes toward sanitary practices.

Storage and supply rooms are especially important to food service sanitation, because it is here that many products are stored in bags made of paper, cotton cloth, or burlap. These bags afford little protection against infestation by insects and rodents or against contamination by poisonous and toxic substances. Such infestation or contamination may not be detected until after affected products have been served, causing consumers to become ill. Sanitation standards of state public health agencies for these as well as other lunchroom areas and services should be followed at all times.

The storage room for food supplies should not be so air tight as to prevent proper ventilation. Poor ventilation permits condensation which may drop on stored food and promote mold and bacterial growth. Good ventilation also minimizes heat build-up, objectionable odors, and the concentration of toxic gases. Custodians responsible for cleaning lunchroom areas, including storage facilities, should always see that these areas are properly ventilated.

Proper storage and disposal of all garbage and waste incident to lunchroom operation are essential to protect against possible contamination of food, utensils, or equipment; to minimize odor concentration; and to prevent such waste from becoming an attractant or harborage and breeding place for vermin. (See section on "Disposal of Refuse" in Chapter 11.)

Shower and locker rooms, often regarded as complementary units, are usually separated by drying areas with connecting passageways. These areas require the same high standards of sanitation as are recommended for toilet rooms. Shower and locker room floors should be mopped daily and should be thoroughly washed twice a week with a solution of hot water and a cleaning-disinfecting preparation. Walls of shower stalls and of gang showers may become coated with oily deposits from the bodies of bathers and with an insoluble soap curd, particularly if the water is hard or if it has not been treated to remove minerals. These walls must be scrubbed at frequent intervals to remove such deposits, the frequency of scrubbing being determined by experience at a given location. A cleaning compound that contains both a mild abrasive and a solvent such as ammonia or trisodium phosphate probably will prove most effective in cleaning walls around showers.

Other custodial duties essential to shower and locker room sanitation are dusting and cleaning lockers, washing seat boards of benches, cleaning the polished parts of shower heads and other exposed metal parts, checking ventilation, and adjusting hot-cold water valves to prevent burns. Water closets, urinals, lavatories, and dispensers located in shower and locker rooms should be given the same attention that has been recommended for these items in toilet rooms.

School swimming pools are becoming increasingly popular across the country, both as facilities for instruction in physical education and as facilities for recreation by school and nonschool groups.

Public health and school authorities are concerned with sanitation and safety problems relating to pools, especially the communicable disease aspects of them. If the health and safety of those who use school swimming pools are to be safeguarded, all rules pertaining to public pools, as established by public health authorities having jurisdiction, should be observed. (See Chapter 12.) This means, among other things, that the school pool must be supplied with pure water that is continuously disinfected by chemicals so controlled that their residual disinfecting strength is maintained at a safe level at all times; it must be kept sanitary by appropriate washing and rinsing of all internal surfaces; and all auxiliary facilities, such as dressing rooms, toilets, showers, and walkways, must also be kept sanitary.

Chemicals used in controlling the quality of pool water should be such that they impart no toxic qualities to the water; water alkalinity must be kept within safe limits; and any visible dirt on the bottom of the pool should be removed within 24 hours by flushing, skimming, or other effective means.[3] As an added safety measure, the deck or walkway around the pool must be clean, free of litter, and to the extent possible maintained in a nonslippery condition. Springboards should be inspected frequently to see that they are properly anchored, in sound condition, and not slippery.

Disinfecting

The process of cleaning any surface or object is in fact one aspect of disinfecting that surface or object, but through common usage of the term, disinfecting has come to mean the process of applying a chemical agent to destroy harmful microorganisms. If school buildings are kept clean through proper housekeeping procedures there is no need for using disinfectants. A historical statement on this subject reads as follows:

> In combating contagion, modern sanitary practices have eliminated disinfectants for spraying walls, ceilings, and floors of classrooms. The source of infection is the individual; so long as the infected individual is present in the room, any disinfectant that might be used on the walls or floor would be of little value in preventing infection. Removal of the infected individual usually suffices to end the danger of spreading the infection.
>
> Soap and water is the best agent for cleaning floors, together with plenty of fresh air and sunshine. It is unnecessary to worry about contagious disease organisms that may be lodged on the walls or ceilings. The same applies to toilets and urinals. Cleanliness will take care of the whole problem without resort to strong disinfectants. In fact, terminal disinfection, such as fumigation with formaldehyde, has generally been discarded as valueless. In the case of lavoratories, urinals, and toilet bowls, so-called germicides in reality accomplish nothing except covering up primary odor by the stronger odor of the chemical used.[4]

A recent statement supports the above viewpoints but adds that "a detergent might currently be substituted for soap" and that

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[3] U.S. Department of Health, Education, and Welfare, Public Health Service. *Environmental Health Practice in Recreational Areas.* Public Health Service Publication No. 1195. Washington, D.C.: Government Printing Office, 1966. pp. 86-87.

[4] American Medical Association. "Disinfectants." Queries and Minor Notes. *Journal of the American Medical Association* 96: 1098; March 28, 1931.

" 'elbow grease' is essential in the effective application of either product."[5]

Neither disinfectants nor deodorants should be used to mask odors that should be eliminated by removing their causes. Odors mean that cleaning has been inadequate. The good custodian will develop and sensitize his olfactory sense so that he can detect bad odors immediately. He will then remove their cause and not rely on chemicals for sanitation.

Attempts have been made to disinfect air by the use of ultraviolet irradiation or the use of triethylene glycol vapor with the hope that such procedure would reduce the incidence of colds and other communicable diseases. However, to date the value of these measures has not been demonstrated. Neither suggested method of air sterilization is recommended for school use.

ELIMINATING ACCIDENT HAZARDS

School accident hazards may be grouped into four categories: (a) fire, (b) mechanical, (c) electrical, and (d) maintenance. School housekeeping plays an important role in eliminating hazards in each of these categories.

Hazards from Fire

Of all potential hazards to life in schools, fire is perhaps the most feared and least expected—most feared because of the tragic toll it has taken; least expected because of the feeling that "It can't happen here." Protecting pupils from fire is a continuing responsibility of school officials, especially principals. The principal of each school is directly or indirectly responsible for the enforcement of state and local fire regulations relating to his building. He and his custodians should be fully aware of all hazards within the building, and they should see that these hazards are corrected or are reduced in potential. This can usually be accomplished by a monthly self-inspection made by the principal and head custodian, followed by necessary action by the custodian or the maintenance department.

Self-inspection forms are available from several sources, one of which is the National Board of Fire Underwriters. These forms are designed for use on both a monthly and a quarterly basis. A member of the local fire department or the fire marshal himself should accompany the principal and head custodian on the quarterly inspection. A report on each inspection (both monthly and quarterly) should be filed with the board of education having jurisdiction. Hazards listed in the report that require official cognizance and action by the board of education should be called specifically to its attention.

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[5] Larimore, Granville W. "School 'Housekeeping' Practices." Questions and Answers. *Journal of the American Medical Association* 202: 922; November 27, 1967.

In addition to his other duties relating to fire safety. the principal should develop evacuation plans for his building, hold evacuation drills frequently, promote instruction in fire safety, and enlist the active support and participation in the school's safety program of building occupants (teachers, pupils, custodians and other noncertificated employees, and any other persons assigned to the building).

Good housekeeping, undoubtedly one of the most prudent precautions against school fires, is usually performed by school plant operating personnel under the direction of the building principal or other designated official. The importance of this precaution against fires can be illustrated by enumerating some housekeeping duties that affect fire potential. These include, but are not necessarily limited to, cleaning, waste and rubbish removal, incineration, storage, care of decorations, handling of ashes and clinkers, thawing frozen pipes, and handling flammable liquids.

Fire is less likely to originate in a clean building than in a dirty building. All waste accumulations such as paper, discarded fabric, cardboard, excelsior, wood shavings and sawdust, and other litter and rubbish of a combustible nature should be removed from the premises daily. If these waste materials are disposed of by incineration, precautions should be taken to prevent the incinerator from discharging sparks or flame into the atmosphere.

Storage areas should be periodically emptied of items that are no longer of use, such as furniture or equipment awaiting repairs or beyond salvage and any accumulation of operating supplies that may have deteriorated or become obsolete. Housekeeping in "prop" rooms is particularly important as a fire preventive measure. Many decorations such as scenery, drapes, curtains, valances, special lamps, objects made of paper-mache, and decorative materials used in connection with holidays and seasons of the year are usually stored in these rooms. All of these items should be flameproofed before they are installed, used, or stored.

Flammable liquids and gases should be limited in quantity to minimum requirements for maintenance, demonstration, treatment, and laboratory work. These products should be placed in UL-approved safety cans that hold no more than one quart each, and the cans should be stored in metal cabinets.[6]

Mechanical Hazards

Mechanical hazards, usually inherent in building design and construction, are not amenable to correction without making physical changes, but dangers from them can be minimized by good housekeeping. A few examples of mechanical hazards and what can be done to minimize dangers from them will serve the purposes of this publication.

Outside platforms and steps at entrances feature two dangers: one caused by weather conditions and one caused by wear and tear. In localities having freezing temperatures, there is a recurring danger from the accumulation of snow and ice on these platforms and steps. If not removed, this accumulation can cause falls and serious injuries.

Handrails for steps and balustrades around platforms may become loose from wear and tear or may be damaged by weather conditions. Good housekeeping and maintenance dictates that repairs be made or replacements installed the moment these components are found to be defective. Handrails and balustrades at inside steps and landings should also be kept in a safe condition. The tops of balustrades and any center-mounted handrails (if permitted by exit and safety codes) should be provided with some type of obstructions mounted on the top rail to prevent boys and girls from using them as slides.

Stair treads and risers may be found hazardous in some schools. Treads without nosing, too narrow, or with a forward slope should be replaced, as should risers that are either too high, too low, or uneven in height. Sometimes corrections can be made on treads by applying safety strips and nosings to them. If uneven and irregular riser height is the hazard, a replacement job by the maintenance department is the only sound remedy. The top tread of stairs may be painted a conspicuous color or provided with a metal strip.

Glass in doors can be dangerous. It should be either tempered or wired glass, or one of the new transparent, flameproof plastics. Special attention should be given to see that glass in entrance doors is shatterproof and relatively noncutting if broken. It should have identifying marks or symbols on it, at varying eye levels, to prevent accidental injury.

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[6] National Fire Protection Association. *Flammable Liquids Code.* NFPA No. 30. Boston: the Association, 1961. p. 38.

Door hardware that is not the right type and is not properly maintained is another potential mechanical hazard. Exit codes require all exit doors to open outward and all classroom doors to open in the direction of the outward flow of traffic. All exit doors must also be equipped with antipanic hardware to prevent pupils from being trapped in a building. These devices should be maintained in an operative condition at all times and should never be chained when a building is occupied. Doors that do not operate in accordance with applicable exit codes should be rehung to conform. Classroom doorlocks should be of the type that can be operated without a key from inside the classroom.

Instruction room hazards are more pronounced in industrial arts laboratories, science laboratories, gymnasiums, and homemaking suites than in regular classrooms. Laboratories of various kinds have multiple hazards because of the nature of their equipment and of the activities carried on in them. Slippery floors near power woodworking or metal working tools or an accumulation of sawdust and wood or metal shavings near them can be extremely hazardous —not only to operators of the equipment but also to those who may walk by it. Floors in these areas should have nonskid surfaces around dangerous machinery. An exhaust system should be provided to pick up dust, shavings, sawdust, and other waste created by woodworking activities. Spray and finish rooms in shops should have exhaust systems to discharge odors and mists from these rooms to the outside. Auto shops, welding and forge laboratories, and agricultural laboratories where farm tractors and other equipment are repaired are particular sources of poisonous fumes and should have ample exhaust systems.

Places where electricity is used have hazards in terms both of equipment and high voltage. Electrical switches should be located within easy reach of operators, and a master switch to control the flow of electricity to any part of the area should be easily accessible to the instructor.

Where a kiln is in use, a red signal light in the corridor should indicate this.

Science laboratories in which chemicals are used and stored can be extremely hazardous to health and to life. Chemical fumes often generated in these laboratories are not only objectionable from the standpoint of odor, but also represent a menace to health. Here again an efficient exhaust system, including hoods over areas where fumes are generated, is necessary. All hoods and ducts to this system should be kept clean.

Gymnasiums may have multiple hazards to safety and life that good care and management cannot eliminate, but attention is directed to two areas in this facility where housekeeping can be effective in reducing accidents: slippery floors and obstructions. Floors can be made virtually nonskid by applying a surface finish that is nonslippery and by keeping them clean. Impact points and obstructions in gymnasiums that present hazards for physical education students and to participants in athletic contests should be padded to prevent serious injury. Walls or projections that are too close to goals, bleachers that are near the playing courts, and doors that project into the gymnasium are examples of points at which safety padding can be placed.

Home economics suites may have hazards similar to those of private homes. These areas require special measures, in addition to those required for other areas of the building, including inspection of electrical and gas appliances; provision of pilot lights for such electric appliances as irons, stoves, heating units, kilns, and ovens; the checking of electrical outlets for unauthorized extension cords; the checking of gas outlets, valves, and jets for leaks; the grounding of equipment that is powered by electric motors (washers, dryers, mixers, window exhaust fans, room air conditioners, and sweepers); and maintenance of floors in a nonslippery condition.

Boiler rooms are also areas in which mechanical hazards exist. High pressure boilers in schools are rare, but low pressure units can be equally dangerous if they are not given proper attention. Some periodic housekeeping chores for greater safety of boilers and boiler rooms are testing safety exhaust valves; checking water gauges; cleaning flues and furnace pipes; inspecting pressure gauges; checking for leaks in oil lines and connections and in gas lines and connections wherever these are used as fuel; inspecting return pumps to see that they are working properly; and inspecting fireboxes, grates, air controls, dampers, breeching, and automatic fuel feeds, as appropriate, for the type of boiler and kind of fuel used. All boiler refuse, such as clinkers in the firebox and fly ash in tubes, should be removed in metal containers daily. Furnace rooms should be used for no other purposes than to accommodate the heating plant and water heaters and should be kept free of litter. Storage space for coal, usually adjacent to the furnace room, should be well-ventilated to prevent spontaneous combustion.

Water heaters and hot water storage tanks, whether located in boiler rooms or in other parts of the building, must be checked several times a year to see that thermostats are responding according to temperature settings on the automatic control. A further safety measure for water heaters is to drain and flush them as often as the manufacturer's instructions recommend. This procedure prevents the accumulation of sediment that can interfere with the safe operation of the unit. Building codes require that safety valves be installed on water heaters to prevent explosions when water is converted to steam by overheating. Water heaters without safety valves are probably very rare, but if one is discovered, a release valve should be installed without delay.

Electrical Hazards

Perhaps the greatest hazard in schools accountable to electricity is fire, especially in older buildings which may have open wiring, knob and cleat work, metal switch covers, or an inadequate number of service outlets to accommodate an increasing amount of electrical equipment. Sometimes switch boxes and panel boards are found in unprotected wooden cabinets. Demand for better illumination in older buildings imposes current loads too great for their wiring to handle. Wire inadequate for the load will get hot under its insulation, and if the overload continues for several hours, the heated wire can cause a fire.

Another danger from substandard electrical wiring is electric shock or, under certain conditions, electrocution. For example, a metal covered surface switch with a metal toggle handle can be especially dangerous if the operator serves as a ground or if the switch itself has a wet ground. Good housekeeping cannot remove dangers inherent in outmoded wiring, which should be replaced according to standards of the National Electric Code, but metal covers for boxes, outlets, and switch boxes and switches with metal handles can and should be replaced with nonconductive materials. All electric motors used to operate machinery and equipment should be grounded, and any exposed wiring should be shielded.

Several types of electrical hazards that are not attributed to outmoded wiring are frequently found in both old and new buildings. For example, extension cords may be draped over nails or steam and water pipes. If the wires of these cords become exposed due to defective or worn insulation, there is danger of a short circuit and possibly a fire. The stage of an auditorium is another area in which infringements on electrical safety rules are often found. Here, amateur stage electricians use their limited skills to wire for stage productions, improvise spot and floodlights, and do miscellaneous electrical work neither too wisely nor too well. The results can be disastrous. Principals and custodians, as a part of their housekeeping responsibilities, should exercise rigid control over such matters, directing that all electrical wiring be done by licensed electricians according to the National Code.

Maintenance

Maintenance as a facet of school safety is inextricably linked with each of the three preceding hazard categories. Inadequate or improper maintenance of school facilities allows them to deteriorate rapidly, thus reducing the safety factor. In addition to maintenance responsibilities relating to the preceding hazard categories, there are other elements of the school plant the maintenance of which, or lack of it, affects health and safety.

Playgrounds that are neglected can become eroded, exposing sharp rocks; can be infested with poison ivy, briars, and other growth that is hazardous; and paved surfaces can break up or become rough and dangerous by alternate freezing and thawing, or by heavy vehicles moving across them. Playground equipment may be partially displaced from its footing, leaving it precariously balanced, or moving parts of the equipment may become unsafe by the loss of screws, bolts, nuts, and other fasteners. A variety of injuries and associated infections can be caused by these hazards if they are not quickly detected and corrected.

Ventilating systems, regardless of type, can become inoperative. Clogged vents, dirty filters or no filters at all, and defective blowers or blowers that have been shut down cause systems to fail. The absence of proper ventilation because of these or other defects—and neglect—is a definite menace to health and effective learning. Maintenance conducted according to a planned schedule can prevent this failure and menace.

Adequate maintenance of fire protection equipment—detective, alarm, and extinguishing—can add measurably to the safety of school buildings. This is especially true of detective and alarm systems. While extinguishing devices can and do save lives, their designed function is to save property. To be effective, however, all fire protective equipment must be adequately maintained and skillfully operated when needed. The best source of information on its maintenance is the manufacturer of the particular equipment.[7] Installation, maintenance, and operating instructions are usually furnished by the manufacturer when the equipment is bought. This information should be placed in the hands of and kept by the individual responsible for maintaining it.

PROMOTING COMFORT AND WELL-BEING

Physical conditions around schools affect the comfort and well-being of pupils and teachers. These conditions include such factors as light, acoustics, and heat and ventilation, each of which is the subject of a separate chapter. Here, the relationship of school housekeeping to these conditions will be pointed out.

Light

A well-lighted environment permits an individual to see well, discourages unsanitary conditions, and improves morale. Two housekeeping functions that affect visual comfort are brightness balance (reduction of glare) and adequacy of light output. One basic rule for avoiding glare and providing brightness balance is to diffuse the light. Housekeeping and maintenance functions that help maintain desirable brightness balance are cleaning and painting. The importance of cleaning (washing and dusting) was discussed earlier in this chapter. Painting, a maintenance function, involves selecting good quality flat paints of the right color and then applying them evenly.

An adequate level of illumination (light output) for efficient performance of visual tasks is determined by the nature of the visual tasks. Within the total visual environment, therefore, different illumination levels may be adequate, each in relation to the particular visual task. Under optimal conditions for comfort and efficiency, the brightness of the task should be equal to or slightly greater than the brightness of the entire visual environment.[8]

In addition to cleaning fixtures, housekeeping responsibilities consist principally in relamping all fixtures on schedule. The average life-span of incandescent lamps is from 750 to 1,000 hours, while that for fluorescent lamps is from 4,000 to 7,500 hours. About 20 percent of lamp failures occur when 80 percent of their rated life has been used, after which the rate of failure is very rapid. Relamping should be done before this very rapid rate of deterioration begins. When fixtures are relamped, replacements should have the proper rating for the voltage of current supplied. The local electric power company can supply information on the voltage of current supplied. If the lamp rating is substantially below the voltage supplied, lamp life will be materially shortened; if substantially higher, lamps will not provide the light output of which they are capable.

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[7] Other sources of information are the National Fire Protection Association, 60 Batterymarch Street, Boston, Mass.; National Board of Fire Underwriters, 85 John Street, New York, N.Y.; and Fire Equipment Manufacturers' Association, Inc., Suite 759, One Gateway Center, Pittsburgh, Pa.

[8] American Institute of Architects, Illuminating Engineering Society, and National Council on Schoolhouse Construction. *American Guide for School Lighting*. New York: Illuminating Engineering Society, 1962. p. 10.

Acoustics

Excessive noise causes irritation, nervous strain, distraction, and inefficiency in children, teachers, and others subjected to it. Some noise can be eliminated and some reduced in quantity by controlling the source, which is a housekeeping function.

Noisy motors and fans may be subdued by changing the coupling between them or by installing better insulation between the fans and the points at which they are mounted to the building. Street noises can be absorbed or subdued by planting trees and shrubs with heavy foliage between the building and the street. Grass turf areas, hedgerows, and dense vine growths can also absorb and attenuate street sounds, but care should be exercised in locating these plantings to prevent their interfering with natural light and ventilation of the building.

Heat and Ventilation

Proper heating and distribution of air are conducive to pupil and staff comfort and efficiency and are deterrents to upper respiratory infections. Some major factors relating to health are dehumidification due to constant recirculation of air, drafts, room temperatures that are either too high or too low, inadequate supply of fresh air, and circulation of atmospheric dust.

Health authorities suggest that a relative humidity of 45 to 50 percent provides maximum comfort. This level of humidity can be maintained during the heating season only if the heating system itself is properly designed and is in satisfactory operating condition, the latter function a housekeeping responsibility.

Housekeeping procedures may improve faulty heating and ventilating systems by checking radiator air vents; by inspecting valves to see that they are operable; by locating water and air traps in hot water or steam supply piping; by checking the boiler water for oil or other greasy substance which may prevent proper steaming; by examining exhaust ducts to see that they are functioning; and by inspecting plenums for obstructions.

If overheating occurs only during the first hour of school, it may be due to cold walls that cause thermostats to send false signals for more heat. The remedy is to start the heating system earlier in the morning so that the overheating will be over before rooms are occupied. If overheating persists throughout the day, the thermostat setting may need to be adjusted downward. Underheating may be due to an improperly set thermostat, to dirty, lint-clogged filters (where unit ventilators, hot air systems, or other installations requiring filters are used), or to mechanical failure. This problem may be overcome by resetting thermostats, by changing or cleaning filters, or by checking mechanical features of the system and correcting any defects found there.

Housekeeping in relation to gravity ventilation involves opening duct dampers at the beginning of the day and closing them at night during the cold season to prevent an inflow of cold air; keeping dampers, grills, and openings clean; oiling bearings of vent heads if they are used; and maintaining intake openings, whether windows or ducts, to control fresh air intake.

Mechanical ventilation systems require cleaning (or change) of filters; oiling motors, pulleys, and shafts as required; cleaning plenum chambers, ducts, fans, and louvers; and an infrequent replacement of V-belts for fans and motors.

The unit heater-ventilator, which may also be combined with air cooling, has an individual motor and squirrel-cage fan in each unit. Housekeeping for efficient operation of this unit requires frequent filter changes (or filter cleaning); lubricating motors, fans, shafts, and pulleys as required; and maintaining dampers in an operable condition.

PEST CONTROL

Pests are plants, animals, and insects that are detrimental to man. This section deals primarily with animal and insect pests that endanger the health and comfort of schoolchildren, among which rodents, flies, and cockroaches are the chief offenders. They are often indicators of filth and definitely are carriers of disease.

Rodents are destructive, filthy, and disease-bearing and have been known to attack and severely injure children. They may carry disease germs and bacteria on their feet, in their hair, in their digestive tracts, and in their bloodstreams. They require both food and shelter and cannot exist where either is lacking. Infestation of premises by them can usually be traced to conditions that favor their growth and life. Removal of these conditions is a permanent solution to the problem, but quick eradication will depend upon killing them.

The elimination of sources of food by keeping garbage and refuse cans tightly closed and by daily removing all refuse from the premises is the first step in removing the food supply of rodents. A second step of equal importance is the storage of all food in rat- and mouse-proof rooms or containers. A third step is to keep the premises clean.

Shelter for rodents can be eliminated by keeping all storage spaces orderly so that there will be no place for them to hide and multiply. Boxes, lumber, grain, and other objects should be stacked on racks at least one foot above the floor so there will be no living space between objects. Building design should avoid double walls, spaces between floors and ceilings, and any other dark space in which rats and mice can nest. Exterior walls should have no uncovered openings; doors should have self-closers; and spaces around doors and windows should be no larger than one-fourth inch.

In instances of severe rodent infestation, it is suggested that the services of an experienced exterminator be obtained.

Insects such as flies and cockroaches can be controlled by a combination of cleanliness, exclusion, and insecticides. Cleanliness alone will do much to prevent insect infestation, especially cockroaches, but flies may be attracted to clean premises by odors from food. Screening as a means of excluding flies from lunchrooms, kitchens, and garbage storage areas was discussed earlier. Structural design that will prevent cockroaches from entering premises will help control infestation, but some may be brought in in boxes, bags, packages, and other items.

There is an insecticide for every insect and for use under all conditions, but it is necessary to know what insecticide to use and where to use it. Up-to-date information concerning insecticides and their use can be obtained from local or state health departments or from experienced exterminators.

THE GOALS

The numerous aspects of school maintenance discussed in this chapter have goals that are important to pupils and to the community served by the school. Good housekeeping practices contribute to the health, safety, comfort, and well-being of all persons involved with the school program and even visitors to the school.

The quality of school housekeeping depends to a great extent on the careful selection of the custodial staff and the in-service training provided for them. Many school systems conduct custodial training programs. Similar programs may be sponsored by state departments of education or by colleges or universities. Summer workshops of several weeks' duration provide valuable in-service preparation.

Even a cursory analysis of the job of housekeeping in a modern school plant reveals that the custodian should have a good understanding of the principles of sanitation, a good sense of order and arrangement, and some knowledge of engineering and combustion. He should know the principles of safety and fire prevention, be familiar with the content and use of many kinds of cleaning materials and cleaning equipment, understand how to care for shrubbery and lawns, and, perhaps most important of all, know how to cooperate with teachers and pupils in the whole scheme of school housekeeping. In smaller school systems where a full-time staff of maintenance workers is not employed, it is essential that custodians be able to make minor repairs to plumbing and to electric and heating equipment, resurface floors, recondition furniture, and keep pumps and motors in running order.

Evidence abounds that wherever there are well-kept schools, there is appreciation of their beauty and recognition of their importance to society. The end products of housekeeping and management are to provide a comfortable environment, to develop better citizenship, to improve community standards, to promote learning, and to develop a greater appreciation of beauty.

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Chapter 5

The Classroom Teacher and Pupil Health

The classroom environment, a factor that significantly influences both learning and health, fluctuates from day to day and from hour to hour. It varies with changes in temperature and lighting, the mood of the teacher, the matters to which attention is directed, the attitudes of pupils, and a multitude of other factors. In a very direct way the classroom environment reflects the teacher's understanding of his pupils and their needs, his ability to motivate their learning, and his success in adapting programs to individual needs.

Children and youth need skills that go far beyond the fundamentals of writing, spelling, reading, speaking, and the basic mathematic processes. They need to learn how to get along with people. Human living is group living, and unless an individual knows how to work and play with others, he cannot live a successful life. School personnel cannot expect that all pupils will have satisfactory human relations skills; school experiences should help pupils grow in their ability to know and understand other people.

In a similar manner, pupils of all ages are faced with health problems, some of a physical nature, others mental or emotional in nature. They have need to understand themselves as living organisms, to learn how to maintain their health, to become familiar with ways of preventing disease and avoiding accidents, and to become aware of their roles in promoting community health. School personnel must continue to design, in cooperation with community groups, health programs that focus attention on the skills and attitudes which enable pupils to deal effectively with health problems.

Many pupils live in environments that are not conducive to mental or physical health; their social attitudes and motivations toward learning may be adversely affected by the situations in which they live. They need help to increase their capacity to face problems that have impact on their mental health, such as poor housing, broken homes, adults who do not understand children, social discrimination, and insufficient family income.

The task of helping pupils become productive members of the changing contemporary society is of crucial importance to all teachers. To create and maintain a classroom environment conducive to health, the teacher may desirably focus his attention on the following questions:

Has the learning process a relationship to health?

How do growth and development affect learning?

What effect does the organization for instruction have on pupil health?

How do evaluative procedures affect pupil health?

What classroom procedures and experiences help meet the health needs of pupils?

This chapter considers each of these questions, with particular attention to the effect of various procedures on pupil health. It takes the position that the health of a pupil is affected by the classroom environment and that this environment results in part from the teacher himself, the teacher's application of his knowledge of the learning process, pupil growth and development, the organization of instruction, and the choice of evaluative procedures.

LEARNING PROCESSES AND BEHAVIORAL CHANGES

Effective application of what is now known about how pupils learn is of fundamental importance to pupils. When pupils are learning satisfactorily, the teacher is pleased and pupils gain satisfaction from their achievements. When learning does not progress satisfactorily the teacher is disappointed, and pupils may become depressed, disgruntled, uncooperative, or despondent.

Acceptance and Interpretation

Learning is a personal matter in which the learner does his own learning. Children and youth learn continuously from their experiences with people, events, and things in the environment with which they interact. What they do is the result of the interactions of their experiences within and outside of the school. Their behavior in the classroom reveals their unique qualities and their acceptance and interpretation of the school world, both of which are influenced by previous experiences.

A first grade class, in preparing for a visit to the dairy was talking about the need for drinking milk. Tommy raised his hand and said, "But only babies drink milk!" Later the teacher found that in

Tommy's home the family budget could not be stretched to provide milk for all the family. Only the baby had milk to drink!

Effective teaching cannot be limited to telling, directing, and judging pupils. When difficulty in learning arises, it may not be because the pupil does not want to learn but because the topics that the teacher is presenting seem unimportant. It is necessary for a teacher to know how children and youth perceive what is being said or read or done. Telling and teaching are not synonymous. When a teacher tells a pupil something, he cannot be sure that the pupil will interpret the words in the way they were meant.

Physical, Mental, and Social Interrelationships

Teaching is a process of relating to children and youth in such a way as to facilitate learning. It consists of creating the kind of emotional climate in which pupils will feel secure enough to venture and explore; an intellectual climate that provides a range of stimuli sufficiently wide to seem significant to pupils with different backgrounds, needs, abilities, and purposes; and a physical environment that is healthful, attractive, and pleasant. The interrelationship of the emotional, social, mental, and physical factors must be recognized as having an important influence on learning.

If a pupil is tired, or has been disturbed by something that occurred before he came to school, his behavior may be vastly different from what it was the previous day. If pupils are asked to sit still for an extended period of time, they may lose interest and begin to move about in order to satisfy their urge for physical activity. If pupils are placed in situations which call for a higher order of social skills than they possess, they may become frustrated and tend to withdraw. Tasks that are far beyond the intellectual ability of pupils also may create harmful tensions and frustrations. Thoughts, feelings, relations to others, and physical well-being are bound together inseparably. If a teacher wants to teach effectively, he studies each pupil, helps him to plan his work, and judges his achievement in terms of the pupil's purposes.

Personal Meaning and Behavioral Changes

Teachers are aware of the influence of outside forces upon pupils' growth and learning and consequently are concerned with many factors relating to behavioral changes.

In structuring experiences which will have significance in motivating healthful living, teachers must include consideration of important aspects of culture. Wide variations in family customs exist in most school areas. Recognition of these cultural differences provides a base for meeting the needs of individuals in the classroom. Food patterns and methods of food preparation at home may differ significantly from the menu of the school lunchroom and from the content suggested in homemaking education.

Value systems have important relationships to effective behavioral changes. Children and youth come to school with different philosophies and variant value systems. Attitudes of children and youth may be a reflection of values. They will be highly motivated to learn when classroom viewpoints concur with their individual philosophies and values. Under these conditions they will also retain more of what they learn. It becomes a challenge for the teacher to discover values that are important to children and youth and to guide them toward the development of values that bring about desirable behavioral changes.

Fred, an eleventh-grade student, came from a middle-class family. One day he asked to be exclused from class to go to the nurse's office. In questioning Fred, the teacher found that he had a toothache and was hoping the nurse would take care of it "because dentists cost too much." Through this brief conversation, the teacher discovered the need to help Fred compare the high cost of dental neglect to the low cost of routine dental care.

Customs and traditions are also factors in influencing behavioral changes. For example, in a classroom where the use of alcoholic beverages was being discussed, a pupil had difficulty understanding the effects of excessive use of alcohol. In his home wine was regularly used at dinner time.

Socioeconomic status also influences behavioral changes. For some groups it is often difficult to achieve the health standards established; therefore, what is being taught may have little personal meaning.

The extent to which pupils will change their behavior under the influence of the school depends in considerable measure on the ability of the teacher to understand that the motivation for learning belongs to the learner. The learner can be helped, but he must do his own learning.

GROWTH, DEVELOPMENT, AND INDIVIDUAL DIFFERENCES

As a teacher becomes aware of pupil growth and developmental changes, he realizes the need for adapting the classroom program to individual requirements. It is possible to summarize the growth characteristics of pupils at various age levels and to establish expectancies for different grades. Such information, however, should not blind the teacher to the fact that each pupil must be considered an individual with his own capacities, rate of growth, developmental needs and tasks, and ability to grasp and utilize concepts and meanings. The rates at which different pupils develop and grow physically, socially, emotionally, and intellectually vary considerably. Growth and development are irregular; pupils differ in their rate and level of development.

Providing for Individual Differences

Classroom experiences cannot have purposeful and personal meaning for pupils unless provision is made to accommodate individual differences. A teacher needs to utilize procedures which enable him to know each pupil. He counsels, plans, guides learning activities, and helps each pupil to evaluate his own progress.

A teacher should be sensitive to individual differences in reading levels, in ability to express ideas in oral and written form, in motor skills, in expression through art and music, and in emotional and social adjustment. He seeks constantly to increase each pupil's achievement in all areas of learning. He tries to adapt the program content to the needs of each separate child.

A significant change in teaching methods takes place when teachers become aware of differences in pupils and accept a responsibility for meeting individual needs. Adaptation may be accomplished by special groupings, varying activities and materials, giving individual help, using a variety of teaching techniques to maintain interest, changing the amount of time needed for the completion of work, simplifying content, using audiovisual materials, utilizing community resources, developing individual and small group projects, enlisting parental cooperation, and providing work materials on various levels of difficulty.

Individual differences often occur because of handicaps resulting from physical defects. The teacher can provide for such needs by seating pupils in relation to the size of seats or in accordance with pupil preference. He can provide a lefthanded pupil with a work place where he may write comfortably. He can arrange classroom furniture to facilitate small group or individual work. Children and youth with vision or hearing defects should be permitted to select seats best suited to them.

Effective teaching calls for developing a satisfactory method of caring for individual differences. It promotes healthful living within the classroom environment.

Exceptional Pupils

The teacher is in a unique position to observe and identify pupils who may need special attention. Some pupils may have emotional problems which prevent them from learning effectively or from interacting with others constructively. Others may be mentally retarded or intellectually superior. Some may have unusual ability in art, music, science, or mathematics. Educators agree that the regular classroom is the best environment for most pupils with special needs. These needs can usually be met if the teacher is able to make special provisions for them. Occasionally special classes with specially prepared teachers may be required. Regardless of class placement, parents and school personnel should help a pupil to accept himself and to realize his full potentialities.

The child or youth with special needs is first of all an individual with human fears, hopes, and aspirations. His need for affection, recognition, and self-development must be met within the framework of his differences. He, like all other pupils, should be helped to gain a sense of being a worthy member of his group.

Modern classroom procedures encourage growth and development in many different ways. They permit pupils to explore, to investigate, and to actively engage in a variety of learning activities; they foster realistic attitudes of self-acceptance and self-understanding. Pupils are helped to acquire skill in analyzing, synthesizing, evaluating, applying, and achieving insight into problem solving. Children who are emotionally disturbed, culturally deprived, and generally disadvantaged or handicapped are provided with special materials, equipment, and services.

Meeting the Need for Rest

The teacher's knowledge of a pupil's level of physical and emotional development and of any special health problem that may exist aids in selecting those who need rest at school. Parents should be responsible for seeing that children and youth get adequate sleep at night. When this occurs, the number of pupils needing complete rest periods during the school day will be comparatively small. The physician and nurse serving the school can advise parents and teachers of the need for additional rest periods for particular children during the school day.

The need for rest and relaxation periods depends partly on the type of educational program offered and the emotional tone of the classroom. Tension, fear, boredom, and frustration produce fatigue; interest, enthusiasm, and achievement minimize fatigue. A change in type of activity is sometimes as refreshing as a rest period.

Classroom activities should permit periods of concentration and sedentary work to be followed by opportunities for big muscle action such as music, games, physical education, and dramatics. The younger the child, the greater his requirement for frequent change of activity. Brief periods of quiet work interspersed with freedom to move about the room or engage in vigorous physical activity are best. Rest and relaxation may be provided through storytelling, listening to music, playing quiet games, or browsing among library books.

At the secondary level, with its departmentalized program, students may need guidance in selecting a balanced program. Alternation of concentrated study with classes providing more freedom of movement helps to prevent or overcome fatigue.

Some students may become excessively involved in clubs, athletics, dramatics, publications, music organizations, or community activities. Such activity is desirable and offers the participant considerable pleasure and satisfaction. However, parents and school personnel should help students plan a sensible program of daily activity which will provide for a variety of activities and avoid undue fatigue and tension.

The Need for Activity

Outcomes of vigorous play and activity go beyond the physical aspects of human development or the acquiring of safety experiences. All children and youth need to participate in physical education and recreational activities. These help girls and boys acquire skills that build feelings of adequacy, promote confidence, encourage group or team spirit, and facilitate experiment and exploration of movement as a mode of expression and communication. Sufficient equipment, supplies, and play areas are necessary for school physical education programs if pupils are to have opportunities to develop the skills and body coordination that will serve them throughout life.

Physical activities should be appropriate for the age and level of development of each pupil. Children and youth differ in physical ability. The classroom teacher, in cooperation with school health personnel and physical educators, can plan a program suitable for each pupil. The program should result from a study of the abilities and limitations of each pupil and should incorporate suitable protective measures.

Physical education and recreation contribute to many aspects of health, growth, and development. From the point of view of healthful school living, they offer relief from sedentary programs, provide an outlet for pent-up energy and emotion, and constitute a means of promoting physical fitness for daily living. The total development of each child and youth is an important prerequisite for learning in any area of the curriculum.

ORGANIZING INSTRUCTION AND PUPIL HEALTH

The school environment contains many human and material resources for improving the health of children and youth. Classroom teachers and other adults within the school provide a healthful environment and interrelate health education concepts with many aspects of the curriculum. The countless interactions of pupils with adults and other children and youth as they work, play, or relax in the classroom, in the school lunchroom, or on the athletic field can be utilized to strengthen pupils' feelings of security, of achievement, and of group cohesiveness. The material resources, such as buildings, grounds, equipment and apparatus, and the human resources, such as teachers, principals, nurses, physicians, custodians, and bus drivers, are influential in enhancing the health learnings of children and youth. The community environment also has human and material resources for enriching health learning experiences. The effective use of the many opportunities provided by resources in the school and community environment is a continuing challenge to teachers.

Every teacher is a part of the total school environment. Each one has responsibility for helping pupils develop constructive attitudes and behaviors for healthful living.

Grouping Procedures Affect Health

As children and youth progress from kindergarten through secondary school, they become part of many different groups, remaining longer in some than in others, but learning new attitudes and practicing different skills with each group. The groups to which a pupil belongs exert strong influences on his development and provide a variety of dynamic learnings. A group is more than a collection of individuals; it has its own personality and uniqueness. The personality of a group is dynamic and changing because it depends upon the network of personal relationships within itself. These change as pupils get to know one another better, work and play together. Fundamental needs for recognition, affection, and a sense of belonging are met in group life.

In the classroom a teacher makes many decisions about a pupil's membership on committees and in other learning groups. These decisions may either enhance a pupil's feelings of self-respect and confidence or create feelings of rejection and unworthiness. Teachers realize that the group powerfully affects each pupil's learning and that the attitudes of his classmates affect the way a pupil feels about himself as a learner. The drive to be noticed and approved by others is a strong incentive in all learning.

Throughout the day and for different kinds of learnings, teachers continuously group and regroup pupils. In some activities, teaching all pupils in the same way may result in a pace too slow for the rapid learners and too fast for the slow learners. Grouping is used to encourage the greatest achievement possible according to each pupil's ability. Sometimes pupils are able to win prestige and recognition from their peers when groups are formed to utilize unique abilities or talents. Many times a group may be formed to make positive use of the differences among its members. This increases the sources of learning as pupils with different abilities and backgrounds work and learn together. Some pupils are able to identify with the class as a whole and experience a sense of contributing to others as they join groups that divide and share responsibilities in the classroom.

At times pupils may be grouped because they have a common need for learning specific skills, attitudes, or understandings. In physical education, for example, pupils may need help with specific skills in throwing and catching before they can enjoy the games in which others are skilled. Permanent grouping is apt to retain some children in groups that are not appropriate for them after changes have occurred in their development. As a teacher recognizes the influences of group membership upon a pupil's attitudes toward learning, toward other pupils, and toward himself, he contributes to the pupil's personal development and academic achievement.

Long-range plans for grouping pupils and for determining their educational goals should not be based on measures used too early or on a single measure at any stage of development. Observations and measures of physical, intellectual, social, and emotional growth should be periodically compiled and reviewed for each pupil throughout his school years.

Classroom Responsibilities

Democracy is a fundamental and lasting ideal of American life. If democratic values are really to be learned by children and youth, they must be "lived" in all phases of the school program. Such key ingredients in democratic relationships as concern for others, acceptance of responsibility, self-direction, cooperative group action, meeting individual needs, and improving human welfare have significance for healthful living within the classroom and for promoting personal and social-emotional growth.

In classrooms where democratic processes are valued, the teacher serves as a guide, a counselor, and a moderator. Adhering to group-formulated standards is important, and each pupil should be helped to understand, accept, and carry responsibilities appropriate to his level of development. Pupils should learn that each individual in the group has rights which must be respected. When a teacher provides a wide range of experiences so that each child is guided toward maximum development of his capacities, it is easier to identify the unique contributions of each pupil. All children and youth, including those of minority racial and nationality backgrounds, develop feelings of belonging and prestige through their contributions to group activities.

Each child and youth needs numerous opportunities to be a leader as well as a follower in rendering service to the group. For every privilege, for every plan of action, and for every set of standards developed to improve group living, there are related responsibilities that must be carried out. Individual development and group welfare require concern for others in all facets of democratic living.

Housekeeping practices in the total school environment offer many opportunities for teachers to involve individual pupils or groups. Procedures, standards, rules, and health learnings may relate to classroom heating, ventilation, and lighting; helping with midmorning or midafternoon snacks; the care and use of school lavatories; the various duties which contribute to an orderly and attractive classroom; use of equipment and materials; storage and care of footwear and wraps; behavior in the halls; school safety practices; disposal of handkerchief tissues and towels; sanitation of lockers; proper use and care of drinking fountains; and helping to create an orderly environment.

Pupils should assume responsibility for the proper use of equipment and supplies in the classroom. This includes the safe use of tools and machinery in home economics rooms, chemistry laboratories, shops, and gymnasiums. In schools where pupils must eat in classrooms, teachers may guide them in using facilities for preparing, serving, storing, and eating food.

A teacher who is alert to the needs and opportunities for health teaching will incorporate democratic processes into the total learning situation. A healthful classroom is conductive to learning and provides an environment that is educationally stimulating and aesthetically pleasing.

Importance of Problem Solving

In our rapidly changing society no one can become fully informed about all the issues and problems about which he is required to make decisions. Nor, except in a few specific areas, can he hope to learn all of the information now available.

Essential needs of every child are skill in problem solving and in critical thinking. One of education's greatest contributions is in stimulating pupils to find multiple solutions to problems and in helping them to deal with problems that have no absolute answers. Each teacher must assume leadership in guiding pupils in problem-solving methods.

Problems and issues relating to the physical, mental, social, and emotional well-being of pupils continually occur. Pupils frequently show concern for the controversial issues of the day. What about fluoridation? How true are various advertising statements about health? How harmful is smoking? What are the issues involved in the prevention of air and water pollution? Knowing what resources to rely upon and skill in choosing sources and authorities is needed. Knowing how to evaluate a source of information is essential.

Problem solving requires skill in analyzing data. In a society where only a small percentage of popular information comes from the written word, it becomes a challenge for pupils and teachers to critically examine what they see and hear. Television, radio, and movies present health-related data in a variety of ways. In advertisements, information relating to health is given with professional persuasiveness. Pupils must learn that the degree of emphasis has no positive relationship to the importance or significance of the statement. Modern means of communication offer great opportunities for encouraging critical thinking and increasing health understandings.

Memorization of isolated health facts does not take the place of critical analysis. Health facts should be used as a basis for forming generalizations. Learning opportunities should be provided for pupils to develop skill in interpreting data. It is an erroneous assumption that telling always results in learning or that learning about something inevitably leads to the formation of a proper attitude toward it. Children and youth need guidance in interpreting health facts. Information must be put to use and interpreted in situations vital to pupils if any change in attitudes is to result.

If learning is an active process occurring through the learner's own effort, opportunities must be provided for pupils to solve problems that have personal meaning for them.

A twelfth-grade class, as a part of its study of international regional associations—NATO, SEATO—raised the questions: "Why doesn't somebody do something to keep heroin out of the United States? Doesn't opium get across to us from Mexico?" The teacher, aware of student interest and concern, then asked, "How could we find out whether your opinions are based on fact?"

The problem-solving process had begun. There was problem identification, and the search for data from a variety of reliable sources was started. Further steps in the process were verifying, organizing, and interpreting the information. Appraising the effectiveness of the solution to the problem was the final step. In time the study led the students to an analysis of the activities of the World Health Organization in the broader areas of communicable disease, drug control, and nutrition. This experience offered practice in solving a problem, and the students were encouraged to think critically.

Thoughtful consideration of various aspects of classroom organization and teaching methods is essential if the health of children and youth is to be adequately safeguarded.

EVALUATIVE PROCEDURES AFFECT HEALTH

School personnel have responsibility for evaluating the educational progress of each pupil. Although he is guided by general policies adopted for the entire school or school system, the classroom teacher is the key person in measuring a pupil's success in attaining educational objectives. The teacher reveals the results of his evaluation by the marks he gives, basing these marks on a number of different factors and procedures. Parents are informed of a pupil's marks by report cards or through parent-teacher conferences, the exact procedure varying from school to school and between grade levels. At the end of a term or year, a pupil is either promoted to a higher grade or retained in the same grade, depending upon the progress he has made and on local school policies.

Evaluative procedures have an important bearing on a pupil's emotional health, including his self-esteem, his attitudes toward school, and his feelings about his teachers. In a particular instance the results of evaluation may produce feelings of satisfaction and achievement, coupled with a desire to make further progress. In other instances the results may lessen or destroy interest in learning, cause feelings of antagonism toward the school and the school staff, and create a sense of inadequacy and depression. Because of these factors, evaluative measures should be developed with due consideration to their psychological effects. Methods used must give a fair, realistic estimate of a pupil's achievement and at the same time stimulate and encourage him to progress to the fullest degree that his endowments permit.

Difficult problems sometimes occur because of the persistence of traditional viewpoints and practices relating to marks, testing procedures, report cards, and reports to parents. Fortunately, when parents, pupils, and teachers work together on evaluative procedures, the likelihood of developing practices that contribute to pupil growth, development, and emotional health is great. Parents and teachers need to use new knowledge about learning to modify the traditional methods of marking and grading that were used when they went to school.

The value placed upon learning by the family unit is a factor that influences success in schoolwork. Studies of children and youth from differing socioeconomic environments and ethnic groups reveal wide variations in the way parents regard education. When children and youth come from homes where high priority is placed on education as a necessity for a happy, productive life, they are well-motivated to take advantage of the opportunities the school offers. Sometimes, pressures from home may be directed toward achieving school grades for future social and monetary gains, rather than for the sheer satisfaction of learning. Then, the motivational pattern becomes complicated.

Marking Procedures

When marks or grades are given, the teacher should avoid stressing the comparisons that are implied. If one pupil is compared with another, the discrepancies in abilities and achievement become so apparent that pupils with the least intelligence fall into the background and may become discouraged. Pupils do not have the same abilities and cannot be expected to reach the same level of achievement at the same time. *To the greatest extent possible, the teacher should discuss individual progress with each child or youth.*

It is advisable to use more than one index in determining a mark. Some pupils speak well, while others are more competent in expressing themselves in writing. Some express themselves best through pictures or other art media. A mark based solely on a final written examination places a handicap on the emotional pupil and the one who speaks better than he writes.

The school has a responsibility to interpret to pupils and parents the meaning of marks given. Schools submitting college application forms should interpret their marking system to the college in an explanatory paragraph.

Standardized Tests

Many schools use standardized tests in a systematic program. The results of such tests provide basic information about each pupil's ability to learn, what he has learned, and his most immediate educational needs and interests.

Although standardized tests are helpful in measuring some kinds of learning, they are not suitable for all purposes. They must be used with proper regard to their limitations and supplemented with other techniques. A standardized test may show, for example, the general reading attainment of a fifth-grade pupil. But whether the pupil enjoys reading has to be assessed in other ways, such as determining the books he has read, observing his interest in reading, and considering his contributions to classroom discussions.

In standardized tests, certain tasks and questions are selected and given to large numbers of pupils throughout the country. A pupil's responses may be compared with those of other pupils of the same age or in the same grade. Such comparisons assume that the tasks are presented in approximately the same way and in a similar environment. In fairness to pupils, a teacher giving a standardized test should follow instructions and directions exactly. Knowledge of pupil attitudes and health and the occurrence of unusual happenings during the testing must be considered when interpreting the scores.

Many tasks in intelligence tests relate to experiences common to most children of a particular age, rather than to what they have specifically been taught. Intelligence tests are used to predict probable success in school. Achievement tests, on the other hand, attempt to determine what actually has been learned.

Personality inventories and tests seek to uncover a pupil's intangible characteristics, such as social relationships and personal adjustment. These tests differ in scoring and interpretation and tell the teacher something about a pupil's emotional and social needs. Some person with special preparation, such as a school psychologist, should be available to assist teachers in the interpretation of personality tests and inventories.

A pupil may have missed many experiences most children of his age have had because of his particular home or school background. The teacher's knowledge of such circumstances is necessary in determining how accurately a test measures his ability and learning.

Achievement is not solely the result of ability. Sometimes a pupil does not achieve well because of lack of interest or energy or because of preoccupation with personal or social problems. At other times a pupil may achieve well in a particular endeavor at the expense of participation in other school and community activities.

With the help of guidance personnel, a teacher may use personality inventories and tests, classroom observations, and pupil or parent conferences to uncover nonintellectual influences interfering with a pupil's learning or development. A personality test may show that a pupil gets along well with other pupils, but the teacher's observation may indicate that he is unable to interact with certain pupils in particular situations. Observations may provide the teacher with answers to such questions as Does the pupil assist in making plans with a group? Does he show respect for the feelings of others? Is he willing to share?

The emotional climate in which testing is done influences the value of the results. A friendly, relaxed, and reassuring manner helps a pupil to put forth his best effort. Careful consideration should also be given to proper seating, acoustics, lighting, and ventilation.

Homework Assignments

Pupils' progress in learning can be encouraged through the judicious use of homework assignments. This type of work is valuable if it enhances what goes on in the classroom and if it promotes learning. The assignments should be related to pupil interests. Whenever possible, the teacher should create within his class a situation in which pupils may select different tasks in terms of their special abilities. As pupils plan together what is to be done and how it will be done, different programs of homework emerge.

An agreement among teachers concerning homework policy is desirable. Particularly in the secondary school, the type and amount of homework assigned by one teacher will influence the student's entire school efforts. Pupils accustomed to having specific daily assignments with daily or weekly tests may find it difficult to adjust to projects that require several weeks for completion.

Teachers and parents can enrich the lives of children and youth in ways other than written homework. The varied resources of the community can be used through visits to local libraries, museums, zoos, and recreation and cultural centers. The viewing of educational television programs can often serve as an excellent substitute for other kinds of homework assignments.

When pupils are interested in a problem they will eagerly spend out-of-school time trying to find a solution. Such endeavors should be purposeful, meaningful, and challenging.

Report Cards

The report that presents the teacher's evaluation of a pupil's educational progress should include information concerning all aspects of the pupil's growth. To mention only intellectual progress implies that other kinds of development are not important or are not taken into account.

Report cards may provide information descriptive of pupil behavior, providing answers to such questions as Does he enjoy reading? Does he have difficulty with speech? Does he get along well with others? Does he show unusual clumsiness or poor coordination? Reporting such behavior is most successful when pupils share in evaluative practices.

Since the report card is a permanent record and essentially a one-way communication, it is not a satisfactory means of calling attention to a child's long-standing, irremediable problems or characteristics. To point out repeatedly, for example, that a pupil is a slow learner or has a severe reading problem can only discourage his efforts and leave parents with feelings of helplessness. In instances of this type, the report card needs to be replaced by a conference with parents, during which the particular needs of a child or youth can be discussed and plans made to provide needed help.

Reporting to Parents

Many teachers arrange a series of appointments so that one or both parents of a pupil may take part in an individual conference dealing with the progress the pupil is making in his schoolwork. These conferences supplement information provided by report cards. Before the conference the teacher reviews the record of each pupil and assembles samples of his work.

Records which are most helpful at these conferences are those which provide information about different kinds of development. The records should provide data relating to a child's health and vigor, accidents or illnesses he may have had, indications of special aptitudes or abilities, areas of study in which he excels or in which he is having difficulty, and his relationships to other pupils and to his teachers.

The teacher's study of a pupil's needs often begins with a review of his cumulative record of school progress and cumulative health record. In many instances, study of these records reveals that a pupil having difficulty in schoolwork or in relationships with others has health problems as well.

Teachers have found it helpful to discuss with boys and girls the conferences that are to be held with their parents and to enlist their interest and support. Pupils may help to prepare for the conference by collecting samples of their work, by writing evaluations of their own progress, and by listing their achievements and their problems. The goals of mental health are served by helping pupils to know and accept themselves and to share responsibility for developing their educational goals. Teachers should hold individual pupil conferences to share test results, to discuss relative strengths and weaknesses, to listen to a pupil's aspirations, to help a pupil plan, and to express faith and confidence in the pupil's ability to make further progress.

The emphasis on closer pupil-parent-teacher cooperation demands new skills. Where necessary, school systems should provide special programs to help teachers develop skills in conference techniques.

Promotion and Retention

The self-concept that a pupil builds from the reflections he gets about himself from the people around him is one of the most powerful environmental effects on learning. Many children and youth learn early in their experiences with people at home, in school, and in other situations that they are incapable of performing in expected ways. Their feelings of failure overshadow their feelings of success. They tend to reduce their mental capabilities because of a sense of inadequacy to the point of becoming passive or disinterested.

On the other hand, there are children and youth who experience a more positive relationship to the world and perceive themselves as successful and capable achievers. Their motivational pattern is marked by an eagerness to learn. They can withstand failure and judge it as a possible risk in learning, providing only a temporary setback.

Retaining pupils in a grade to repeat the year's work does not always result in uniform achievement. Frustration and a sense of failure may be created in many children who are retained. Achievement does not improve when disinterest, discouragement, and other negative attitudes result. Doubt about living up to expectations or making friends with other pupils may detrimentally affect the emotional health of pupils. Any change that removes a pupil from a class group should be made only after careful consideration of his needs. If negative attitudes toward teachers, authority, education, and self are developed, they tend to last.

Before a child is placed in a new grade, a thorough individual study to determine the effect of retention or acceleration should be made. The study should focus on assessment of his total development—his physical size, social and emotional development, intelligence, achievement, and age. The feelings and attitudes of the parents and the pupil also should be considered. When a change is made, teachers and parents should assist the pupil in making a smooth transition to the new group. The school must strive to provide a setting that minimizes the tensions that destroy the joys of learning and living.

CLASSROOM PROCEDURES AND PUPIL HEALTH

Included in the total school environment are numerous procedures, usually referred to as school health services, designed to protect and improve the health of pupils. These procedures, cooperative ventures of teachers and such allied personnel as physicians, dentists, nurses, guidance personnel, psychologists, social workers, and others have the following specific objectives: (a) to appraise the health status of pupils and school personnel; (b) to counsel pupils, teachers, parents, and others for the purpose of helping pupils obtain needed treatment or for arranging school programs in keeping with their abilities; (c) to help prevent the spread of communicable diseases; (d) to provide emergency care for injury or sudden sickness; (e) to promote optimum sanitary conditions and to provide proper sanitary facilities; and (f) to protect and promote the health of school personnel. Specific suggestions relating to each aspect of school health services are contained in another publication of the Joint Committee on Health Problems in Education of the National Education Association and the American Medical Association.[1] Rather than duplicate material in that book, reference will be made here only to the role of the teacher and his relationships to other health personnel.

The Teacher's Role

The teacher plays an important role in each aspect of school health services. He contributes to health appraisal through helping with screening tests and through his observation of the appearance and behavior of pupils. Without such observations made at specified times, as well as informally at all times, an accurate appraisal of health is impossible. By identifying pupils whose appearance and behavior reveal deviations from the normal, the teacher helps to prevent the spread of communicable diseases and to uncover other health problems. Counseling pupils with health problems, encouraging parents to obtain medical advice and treatment for their children, if necessary, and helping pupils to obtain special educational programs adapted to their needs are important contributions of teachers to the school health program.

The teacher is often the only person immediately available to help care for a boy or girl who becomes sick or injured at school. Following the administration of appropriate first aid—an area in which every teacher should be competent—the teacher informs the parent of the pupil's condition and, if necessary, helps the parent secure the services of a physician. The details of these procedures should be included in written school policies.

In addition to assisting in school health services, the teacher has responsibility for organizing a program of health education adapted to the needs, interests, and abilities of his pupils. Such programs will capitalize on meaningful situations in the school environment to increase pupil understanding of factors that influence health, as described in a later chapter of this book. (See Chapter 14, "Utilizing the Environment for Health Education.")

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[1] National Education Association and American Medical Association, Joint Committee on Health Problems in Education. *School Health Services.* Second edition. Washington, D.C., and Chicago: the Associations, 1964.

Although education based on environmental factors is important, it is only one part of the total health education program. Children and youth need a regular program of classroom instruction that will help them develop concepts and attitudes in relation to such broad health areas as nutrition, safety, disease prevention and care of the sick, emotional and social health, community health, first aid, home and family living, functioning of the body, human growth, alcohol and tobacco, harmful drugs, and consumer education. Specific suggestions relating to health education at different grade levels are presented in the book, *Health Education*, another publication of the Joint Committee on Health Problems in Education of the National Education Association and the American Medical Association.[2]

Contributions of Other Personnel

The diversity of health problems that afflict children and youth necessitates the availability of special health personnel to advise the teacher and to describe the needs of pupils with such special problems as epilepsy, diabetes, asthma, rheumatic heart disease, and emotional disturbances, in addition to the more common conditions of refractive errors, speech defects, and hearing impairment.

A physician serving the school can interpret to the nurse, the teacher, and to a parent the significance of the results of a medical examination or other appraisal procedure. The findings may indicate a need for medical treatment, an adaptation of the school program, or both. The physician, often with assistance from a nurse, helps the parent and teacher understand what action is needed and encourages them to take such action.

The physician helps in other ways, too. He participates in formulating school health policies, particularly regarding the prevention and control of communicable disease, the care of emergency sickness, and the counseling of pupils with health problems. The physician serving the school acts as a liaison between the school, the medical profession, and the health department.

The nurse serving the school is a consultant to pupils, parents, teachers, and administrators. Her important functions include health counseling and health education and assisting school personnel in carrying out agreed-upon school health policies.

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[2] National Education Association and American Medical Association, Joint Committee on Health Problems in Education. *Health Education.* Fifth edition. Washington, D.C., and Chicago: the Associations, 1961.

Psychologists, social workers, and guidance personnel contribute valuable information about pupils' abilities, the nature of the homes they come from, and the problems with which they are faced. Such personnel are particularly valuable in helping with emotional problems.

Thus, a wide array of special personnel is available in modern schools to help teachers understand their pupils, to indicate how pupils can be aided, and to assist in developing school programs that will effectively promote the full growth and development of each girl and boy.

The relationships between various school health procedures and the school environment are real and significant. Children and youth attending school today are in an environment where health is considered important. The teacher and many other persons are concerned with the health and development of each individual. When health problems occur or develop, special personnel are available to help solve them. No pupil attending a well-organized school can fail to learn that school personnel consider health an essential attribute of effective living.

FOR FURTHER READING

AMERICAN ACADEMY OF PEDIATRICS. *Report of the Committee on School Health.* Evanston, Ill.: the Academy, 1966.

ASSOCIATION FOR SUPERVISION AND CURRICULUM DEVELOPMENT. *Balance in the Curriculum.* 1961 Yearbook. Washington, D.C.: the Association, a department of the National Education Association, 1961.

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ASSOCIATION FOR SUPERVISON AND CURRICULUM DEVELOPMENT. *New Insights and the Curriculum.* 1963 Yearbook. Washington, D.C.: the Association, a department of the National Education Association, 1963.

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LOS ANGELES COUNTY SUPERINTENDENT OF SCHOOLS OFFICE. *A Guide to Curriculum Development and Course of Study for Elementary Schools of Los Angeles County.* Los Angeles: Office of the County Superintendent of Schools, 1965.

NATIONAL EDUCATION ASSOCIATION AND AMERICAN MEDICAL ASSOCIATION, JOINT COMMITTEE ON HEALTH PROBLEMS IN EDUCATION. *Health Education.* Fifth edition. Washington, D.C., and Chicago: the Associations, 1961.

NATIONAL EDUCATION ASSOCIATION AND AMERICAN MEDICAL ASSOCIATION, JOINT COMMITTEE ON HEALTH PROBLEMS IN EDUCATION. *School Health Services.* Second edition. Washington, D.C., and Chicago: the Associations, 1964.

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OBERTEUFFER, DELBERT, AND BEYRER, MARY K. *School Health Education.* Fourth edition. New York: Harper & Row, 1966.

TABA, HILDA. *Curriculum Development.* New York: Harcourt, Brace and World, 1962.

WILLGOOSE, CARL E. *Health Education in the Elementary School.* Third edition. Philadelphia, Pa.: W. B. Saunders Co. (In press)

Chapter 6

Promoting Safe Living in School

It has been conservatively estimated that each year there are more than 800,000 accidental injuries to elementary and secondary school pupils while they are under school jurisdiction.[1] Estimates are not available for nonschool accidents, but it is probable that there are no fewer than two nonschool accidents for every school-jurisdiction accident.

Reliable national statistics on school employee accidents are not available. However, Los Angeles reported that the frequency of teacher accidents exceeded that of the all-industry average of reporters to the National Safety Council.[2] Chicago reported that in 1965, 3.99 percent of school employees were injured and that medical and compensatory expenses amounted to $201,683.21.[3]

The frequency and seriousness of injuries resulting from accidents to pupils and employees makes it essential that safety precautions be taken in every school. Safety policies need to be carefully formulated, and responsibility for safety procedures definitely assigned. The safety program, organized under competent leadership and developed in cooperation with many community groups, should assure purchase of equipment that meets safety standards, include a program of safety inspections, provide for careful accident reporting, and promote instruction in all aspects of safety.

ADMINISTRATIVE RESPONSIBILITIES

As the educational leader of a community, the school administrator has an important role in the school safety program, a role which most accept without question. The administrator's interest in safety and his enthusiastic desire to develop the best possible school safety program will easily and quickly be communicated to other members of the school staff and inspire them to put forth their best efforts.

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[1] National Safety Council. *Estimated Pupil Accidental Injuries in U.S. Elementary and Secondary Schools.* Chicago: the Council, 1966.

[2] Los Angeles City Schools. *Report of Accidents to Pupils and Employees, 1959-60.* Los Angeles: the Schools, 1961. p. 43.

[3] Chicago Board of Education. *Work Accidents Survey, 1965.* Chicago: the Board, 1965. pp. 4-5.

Formulation of Policies

The first task of the administrator is to set forth in cooperation with the board of education clear-cut policies concerning safety education and accident prevention. A number of school systems have produced handbooks for this purpose. The first such handbook was produced by the public schools of Detroit in 1941; a third revision was published in 1961. The public schools of Los Angeles, New York, Boston, Cincinnati, Oklahoma City, and Boulder are among other systems that have prepared special bulletins for safety or have incorporated sections on safety in their administrative handbooks.[4]

Policies must be kept up-to-date by frequent review. This will be one responsibility of the staff member specifically assigned to head the safety program, but all members of the school staff should be alert to report circumstances and occasions for which a policy is needed and none exists.

Policies should be in written form, either mimeographed or printed, and brought to the attention of all who may be affected by them. Some schools find it helpful to maintain policies in a loose-leaf form, a procedure that facilitates their updating.

Delegation of Responsibility

The second task of the administrator is to assign responsibility for directing and coordinating the safety program. This must be done even though, as in the case of a very small system, the superintendent himself accepts direct responsibility for administration of safety policies. In most cases, he will appoint a supervisor, coordinator, or director of safety, and this staff member will be directly responsible to the superintendent.

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[4] National Safety Council. *School Safety Handbook.* Chicago: the Council, 1965.

National Education Association, National Commission on Safety Education. *A School Safety Education Program.* Washington, D.C.: the Commission, 1966.

American Association for Health, Physical Education, and Recreation. *Suggested School Safety Practices.* Washington, D.C.: the Association, a department of the National Education Association, 1964.

There is no preferred department from which this staff person should be selected. Excellent safety education supervisors have come from vocational education, physical education, science, health education, and other departments of the school system; some supervisors have served as school principals. The person with the best preparation, experience, personality, and knowledge of all aspects of school safety is the person for the job. Interest in safety and willingness to become properly qualified are prerequisites.

Opportunities for professional preparation for safety education supervision are increasing. Safety departments in the public schools of Baltimore, Detroit, Oklahoma City, and Philadelphia are headed by men who received their doctorates in safety education. Masters programs, special courses, and in-service opportunities in safety education are available for those who wish to further their preparation.[5] Seminars specifically for safety education supervisors are held on the campuses of many centers of higher learning throughout the United States.

The staff member responsible for safety education should be directly accountable to the superintendent. Some administrators mistakenly have placed responsibility for safety in a certain discipline area of the school system. To do so is to narrow the staff member's responsibility for the safety program and thus greatly to reduce his effectiveness.

The responsibilities of the school safety director, supervisor, or coordinator are clearly set forth in *Recommended Standards for Administration.*[6]

THE SCHOOL SAFETY PROGRAM

Many teachers and school administrators are unaware of the ramifications of the school safety program. When asked about it they may say, "Oh, yes, we have a safety program," and then proceed to tell about the school safety patrol, and that is all. Or they will tell about a driver education course. Others will say that they don't need a safety program because they have Workmen's Compensation. Still others think in terms only of fire drills; only of first aid; or only of audiovisual aids to safety teaching. Some think exclusively of what is being done to prevent accidents, with little or no thought to what is being done to prepare the pupil to live safely.

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[5] National Safety Council. *Safety Courses in Colleges and Universities.* Chicago: the Council, 1967.

National Safety Council. *Safety Education Majors and Minors.* Chicago: the Council, 1962.

[6] National Safety Council. *Recommended Standards for Administration.* Chicago: the Council, 1951.

National Safety Council. *A Job Analysis for Safety Education.* Chicago: the Council, 1959.

The scope of a complete safety program may be uncovered by a definition of the program, by an examination of the people involved, and by an analysis of the school activities and measures to which safety is relevant.[7]

In defining *safety* as it relates to the school program, a distinction may be made between *safety education* and *accident prevention*, with the following definitions. Safety education is that area of experience in which children and youth learn to make wise choices when physical injury to themselves or others may occur. Accident prevention is the control of the environment and/or behavior to eliminate occurrences which result in personal injury or property damage.

A consideration of the types of incidents known as accidents or a classification of accidents may also be helpful in this regard. The principal classes of accidents can be given as motor vehicle, work, home, and public. These headings are often further broken down. For example, home accidents may be examined under such headings as falls, burns and deaths associated with fires, suffocation by ingestion of objects, mechanical suffocation, poisoning by solids and liquids, firearms, poisoning by gases and vapors, drowning, electrical shock and electrocution, and blows by falling objects.

A list of persons involved in a school safety program would include the following: pupils, teachers, principal, office staff, engineering and custodial staff, school health personnel, administrator and supervisory staff, members of the board of education, parents, and members of the official and voluntary community agencies. Actually, everyone associated with the school program has opportunities and responsibilities for furthering the safety and safety education of pupils.

These people may be engaged in such activities as safety curriculum planning with regard to attitudes, information, and behavior; with the evaluation of the curriculum; with the safety of the environment in regard to such matters as selection of school sites and supplies; and maintenance of buildings, grounds, and equipment.

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[7] National Safety Council, Elementary School Section. *The Total Safety Program in Schools and Colleges—A Technique.* Chicago: the Council, 1966.

The complete safety program may include many measures. A set of guidelines or a philosophy to give direction to the activities is needed. All concerned with the school should have some means of participation in safety planning and execution which may be provided through student and staff safety organizations. In-service preparation for the safety aspects of their work is needed by members of the staff. Teaching aids, inspections, research, and fact finding are among measures which contribute. Consideration of all the above angles will help to ensure that a complete safety program is in operation in the school.

Standards for Purchases and Contracts

Failure to utilize safety standards in purchasing school supplies and in letting school contracts can be responsible for hazardous situations in and around schools.[8] Some school officials have indicated that they depend upon suppliers to see that safety standards are met. This is ordinarily an unreliable practice as witnessed by the sale of substandard foreign-made safety goggles to a school in Ohio —and perhaps in other states, too.[9]

Examples of the result of failure to insist on safety standards are numerous and diverse. A safety supervisor in Florida requisitioned a paper cutter meeting a certain safety standard. The purchasing agent turned down the request due to the higher price. He reversed his decision, however, when he was shown the bill for medical and compensation costs for the two most recent accidents in which paper cutters not meeting the safety standards were used.

Closely related to purchasing is the letting of contracts for school buildings. A school building in Ohio was carefully planned to provide circulation of air. Windows were made in pairs so that the top sash of one pair opened while the bottom sash of the other pair opened. However, since the sash swung into the school hall it was impossible to have the bottom sash open without creating a serious hazard to hall traffic.

A call for bids for bleachers in a new school gymnasium was sent out and bids were received. When the director of school buildings asked the prospective suppliers about the safety of these bleachers, they were extremely vague. He found what he needed with respect to standards in a publication of the National Fire Protection Association.[10]

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[8] Johnson, W. G. "Product Safety—What It Can and Cannot Do for School Business Officials." *Proceedings, Addresses, and Research Papers of Association of School Business Officials* 52: 151-59; 1967.

[9] Hughes, Wayne P., and Hopkins, Stuart. "Don't Gamble on Eye Protection." *School Business Affairs* 32:267; November 1966.

A New England university was celebrating the opening of a new library-union complex. A visitor at the ceremonies noted that although one could drive off the highway and up to about a block from the entrance of the buildings, the only way to return to the highway was to back down the driveway. There was no outlet or possibility of a U-turn. A circular driveway should, of course, have been planned. The error in construction was called to the attention of officials, and one can only hope the situation was corrected before a tragedy occurred.

"Product safety" is a concept which came into use as a result of Congressional hearings on automotive safety. As related to schools this phrase may be applied to the purchase of educational equipment, maintenance supplies, and materials used in the construction of the school building or the improvement of the school grounds. Any product used in the school or in the school program may affect the safety of teachers and pupils.

Safety standards of various kinds are available from different sources. Standards for some products are promulgated by the U.S. Standards Institute and for others by the National Fire Protection Association and National Board of Fire Underwriters. The Underwriters Laboratories places its UL label on equipment it approves. Schools can secure much help in setting standards by drawing on those set by the federal government for its own purchase. The General Services Administration, the Bureau of Standards of the Department of Commerce, and the Bureau of Mines, also of the Department of Commerce, are sources of such standards. Codes and regulations of state labor and state health departments offer help with some products. Standards for school buses are available from the National Commission on Safety Education.[11]

A safety engineer can be of inestimable value in checking the safety of various items. As stated in an address to the Association of School Business Officials by William G. Johnson, general manager of the National Safety Council,

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[10] National Fire Protection Association. *National Fire Codes.* Vol. 4, *Build-tion." School Business Affairs* 32: 267; November 1966.

[11] National Fire Protection Association. *National Fire Codes.* Boston: the Association, 1966-67.

Associated General Contractors of America. *Manual of Accident Prevention in Construction.* Washington, D.C.: Associated General Contractors, 1958.

National Education Association, National Commission on Safety Education. *Minimum Standards for School Buses.* Washington, D.C.: the Commission, 1965.

> You should have close at hand the consulting services of a professional safety engineer. This may in some degree be available from your insurance company, but such companies are limited in the amount of assistance they can give, dependent on the degree to which they have built in assistance as one basis for their rate system. In some areas you have available to you the services of safety engineers with the State Department of Labor. Or you might retain a private safety engineering consultant firm. However, I think that the most frequent source of safety engineering consultation is the volunteer service of a member of the American Society of Safety Engineers. Many chapters of this professional association have taken public service to schools as a specific chapter goal. Or, you can almost undoubtedly count on very good assistance from a near-by large plant which has a safety engineer.[12]

Safety is an important factor in all construction activities, whether carried on during the summer months or when school is in session. Contracts for construction work should include a clause requiring that the contractor take measures to protect his own employees, school personnel, and school pupils.

State and local building codes govern the design and construction of new buildings. However, where state and local codes are weak, it is a wise practice to stipulate the stricter requirements of national fire and safety codes.

In choosing a safe location for a school, the services of a city planner who is sensitive to matters of traffic safety or a traffic engineer should be utilized. Such a person can help to determine the most appropriate site, the best location for buildings on sites, the most efficient and least hazardous arrangement of sidewalks and trafficways, and the relationship of entrance and exit points to the flow of traffic in the surrounding area.

A Helpful Checklist

A checklist can be used to help evaluate the safety aspects of products and equipment considered for purchase by schools. The following list, adapted from material presented at a meeting of the Association of School Business Officials,[13] calls attention to some of the characteristics of safe products. A safe product—

1. Conforms to safety standards and codes.
2. Is designed for safe use, handling, and storage.
3. Eliminates extraneous hazards (e.g., sharp edges).

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[12] Johnson, *op. cit.*

[13] *Ibid.*

4. Anticipates possible misuse—especially by children and youth.
5. Is designed for use in the school environment. (Space for use and storage must be considered.)
6. Will not produce toxic vapors, gases, fumes, etc.
7. Is designed for reliability and easy maintenance.
8. Incorporates controls and signals to minimize human error.
9. Is accompanied by adequate information and instructions for safe use and maintenance.
10. Includes optional equipment to maximize safety.

Consideration of safety factors in the construction, operation, and maintenance of school buildings and grounds is one means of creating a healthful environment for pupils.

INSPECTIONS ARE ESSENTIAL

Effective measures to promote safety require that measures be taken to discover existing accident hazards and to determine if all known safety precautions have been taken. Information of this nature, basic to the development of a school safety program, can be obtained in various ways.

Information from Observations

A school safety supervisor described some of his experience with broken glass in these words:

> We had two examples during January and February of why clean playgrounds have more than aesthetic value. Two pupils fell on broken glass and sustained cuts of such severity that medical attention was required. This is an unusual time of year for accidents of this nature, as much of this sort of debris is covered by snow and ice during the winter months. These mishaps do, however, point up the need for inspecting play areas.[14]

Inspections for glass on the playground should be made each day, if not before each play period.

An industrial safety engineer once attended a parent-teacher meeting at his son's school. Arriving early, he met the school engineer in the hall. They stood talking near one of the school's fire hoses. "The hoses are in fine condition," said the school engineer. He turned the water on. The hose burst, thoroughly soaking both the parent and the school engineer. A minor inconvenience; but what a potential for catastrophe!

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[14] Green Bay Public Schools. *Green Bay Public Schools Safety Bulletin.* Green Bay, Wis.: the Schools, March 1967. pp. 1-2.

A principal visited the laboratories and shops in his school to learn whether pupils were using safety goggles when their work might result in flying particles or in the spraying or splattering of dangerous chemicals. This could happen in shops, chemistry and physics laboratories, and in art rooms. He was pleased to find that, with one exception, teachers had instructed pupils regarding the value of safety goggles and insisted on their use.

A pupil was electrocuted while swimming in a school pool. It was an accident which "could not have happened," but did. An investigation revealed that underwater lights had been changed for a water carnival and had not been replaced properly.

The National Fire Protection Association indicates that there were 7,100 fires in elementary and secondary schools in 1965 at a cost of $31,500,000.[15] Surprisingly, the loss of life in school fires tends to be low, probably because many of them take place at night. However, the potential for tragedy in a school fire, or explosion, is so great that no protection should be left to chance.

A letter from a deputy superintendent of a Midwestern school system disposed of inspections with the statement, "We have regular inspections by safety engineers." In a talk before a group of school officials, a safety expert said, "I was once asked by a school superintendent whether it was possible to arrange for an inspection on an annual basis. Of course, I said 'No.' If an annual service had been available, the superintendent would not have initiated the daily, weekly, and monthly inspections which are essential."

These illustrations are sufficient to show that safety inspections differ in type, in scheduling, and in the degree of efficiency of the inspector. Each inspection should be carefully planned and scheduled. Checks should be made to be sure they are carried out. Follow-up and correction of all defects should be instigated immediately.

Help Is Available

The best known safety checklist for schools is the National Education Association's *School Safety Education Checklist.*[16] This is

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[15] National Fire Protection Association. "Fires and Fire Losses Classified, 1965." *Fire Journal* 60: 36; September 1966.

[16] National Education Association, National Commission on Safety Education. *School Safety Education Checklist: Administration, Instruction, Protection.* Revised. Washington, D.C.: the Commission, 1967.

"an evaluative tool designed for use in planning for program improvement." Superintendents, principals, supervisors, classroom teachers, custodians, schoolboard members, parent-teacher groups, civic groups, students, and others should find this checklist helpful in reviewing school conditions and practices that relate to safety and safety education. The purpose of the checklist "is to stimulate thought and action on problems of safety education in schools. Its use should encourage the adoption of regular and thorough inspections of every building for:

(a) safe condition of structures, grounds, and equipment, including the presence of necessary safety devices;

(b) safe practices throughout the school environment;

(c) the optimum use of all these in a school's safety education program."

From these items, the personnel of each school system should see possibilities for developing special lists for purposes unique to their particular school or system. The National Fire Protection Association gives directions for school fire inspections and publishes an abbreviated fire checklist for schools.[17]

A series of checklists for shops and laboratories covering physical condition as well as curriculum have been prepared by the American Vocational Association in cooperation with the National Safety Council. Other checklists are also available from the National Safety Council.[18]

An excellent manual prepared specifically for elementary school teachers places responsibility for the three E's of safety—education, engineering, and enforcement—in the hands of teachers and pupils. "Engineering" responsibility in this manual includes a type of inspection. The manual states,

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[17] National Fire Protection Association. *Life Safety Code, No. 101.* Boston: the Association, 1966. pp. 83-92.

[18] The following checklists are available from the National Safety Council, Chicago, Ill. Single copies will be sent on request without charge.

School Inspection Short Check List of the National Fire Protection Association.

National Standard Student Resident Fire Safety Check List, 1959. (with National Fire Protection Association)

Inventory of Safety Check Points in Business Machine Classrooms and Offices, 1960. (with American Vocational Association)

National Standard School Shop Inspection Check List, 1964. (with American Vocational Association)

National Standard Vocational Agriculture Safety Inspection Check List, 1966. (with American Vocational Association)

National Standard Check List for Teaching Home Safety, 1962. (with American Vocational Association)

Food Service Safety Check List To Locate Hazards, 1963.

> You may think you have little to do with engineering for safety, but you can do much to improve the safety of the classroom.
>
> *Example:* Mr. French found that the inevitable game of baseball during his sixth graders' recess period resulted in conflict, sometimes painful, with the first grade class which shared the small playground at that time. A faculty study led to grouping of more similar age levels on the playground. Another solution might have been to stagger the recess periods.
>
> *Example:* Susan Merriweather, with too many children in too small a room, found that by rearranging the movable desks so that there were three rows, two desks wide, instead of six rows, one desk wide, enough aisle space was gained to allow for rapid and reasonably accident-free traffic.
>
> *Example:* Jim reported that the new custodian was blocking the lunch-room exit with wooden milk bottle cases in violation of the fire code.
>
> *Example:* Hilary suggested that if the children used the north door in going to the playground and the south door in returning, there would be less confusion and less chance of collisions.[19]

So inspections range from regular inspections by safety engineers to moment-by-moment awareness of environmental hazards by teachers, pupils, and patrons—as a matter of fact, by everyone associated with the school. Each inspection has its importance. It needs to be scheduled. Those serving as inspectors need special preparation and should have clearly established procedures for follow-up and correction of undesirable conditions found.

ACCIDENT REPORTS AND SPECIAL STUDIES

The goal of school safety programs is to reduce accidents and injuries through constructive and effective curriculum planning and through realistic improvement of the school environment. The use of an accident reporting system can definitely contribute to this goal, for accident reporting is the keystone of safety programing.

Information from Accident Reports

The following quotation points up and summarizes the assistance to be gained from an accident reporting program:

> The systematic accumulation of school and non-school jurisdictional accident and injury data will provide the school superintendent with information upon which to base:

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[19] Yost, C. P. *Teaching Safety in the Elementary School.* Washington, D.C.: American Association for Health, Physical Education, and Recreation, a department of the National Education Association, 1962. p. 7.

1. Curriculum guidance to educate the child for safe living.
2. A realistic evaluation of safety program efforts on a regular basis.
3. Changes in building structures and facilities, or procedures, to improve the environment of the school system.
4. Organizational and administrative improvements to strengthen the management aspect of the safety program.
5. A strong public relations program, thus lessening public demands for crash programs of little value if an unusual incident occurs.
6. A strong leadership role in community safety efforts.
7. An assessment of the costs of accidents and injuries and their relationship to operating expenses of the school system.[20]

The emphasis in the *Guidebook* is on the use of accident records. Too frequently school systems have kept records merely for the purpose of submitting summaries or to meet evaluative criteria.

Standard reporting makes possible meaningful research through which school people with mutual concerns may share their findings. Trends are much more readily recognized in state and national figures; the relative infrequency of accidents in any one school system sharply restricts the likelihood of spotting trends there.

In Springfield, Missouri, where accident reporting for both school and nonschool jurisdictions is reasonably complete, the annual accident toll is equal to about 5 percent of the total enrollment. This repudiates the argument of the teacher who claims accident reports cause too much paper work. If there are 25 pupils in a classroom, five reports would be filled out in four years; if class size is 35, five in three years; for a class of 100, an average of five reports per year.

The minimum content of an accident report, as given in the *Guidebook*, consists of the following:

1. Name
2. Address
3. School
4. Sex
5. Age
6. Grade/special program
7. Date and time of accident, day of week
8. Nature of injury
9. Part of body injured
10. Degree of injury
11. Number of days lost
12. Cause of injury
13. Jurisdictional classification of accident
14. Location of accident
15. Activity of person

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[20] National Safety Council, Division on Standard Reporting of Student and Employee Accidents of the Safety Education Supervisors Section. *Student Accident Reporting Guidebook.* Chicago: the Council, 1966. p. 1. (Available from the chief state school officer of your state)

16. Status of activity
17. Supervision
18. Agency involved (apparatus, equipment, etc.)
19. Unsafe act
20. Unsafe mechanical-physical condition
21. Unsafe personal factor
22. Corrective action taken/recommended
23. Property damage
24. Description
25. Date of report
26. Report prepared by (signature)
27. Principal's signature

Optional Data (as required by local school system): As applicable, information on first aid, doctor, hospital, notifications, insurance, witnesses, etc.

Reports on Employee Accidents

There is no publication comparable to the *Guidebook* for the recording of employee accidents, but for the most part the information needed is the same.[21] The items called for on an employee accident report form will be dependent, in part, on state laws for Workmen's Compensation, but the information so demanded is not necessarily the type needed for accident prevention purposes. All the information called for on the student form should be on the employee form.

In the past decade there has been a great increase in reports on school employee accidents. In 1957, the Division of Labor Statistics and Research of California issued a publication relating to injuries to public school employees.[22] To date, this appears to be the only such statewide study.

Many school systems now incorporate a summary of their employee accidents with their student summaries, or they prepare a special publication for work injuries. The Chicago Public Schools publish annually a comprehensive analysis of work injuries. (The mimeographed report for 1965 is 60 pages in length.) Among other school systems which either publish special reports of employee accidents or combine them with their student reports are Baltimore;

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[21] American Standards Association. *American Standard Method of Recording Basic Facts Relating to the Nature and Occurrence of Work Injuries.* New York: the Association, 1962.

Cohen, Louis. *The Administration of Non-Instructional Personnel in Public Schools.* Chicago: Research Corporation, Association of School Business Officials, 1963. pp. 80-81.

[22] State Division of Labor Statistics and Research. *Work Injuries in Public Schools in California.* San Francisco: the Division, 1957.

Broward County, Florida; Cincinnati; Detroit; Hillsborough County, Florida; Johnstown, Pennsylvania; Lansing; Los Angeles; and Philidelphia.

Some Special Studies

In addition to day-by-day accident records, there are special studies based either on information in reports or on specially collected data. A study of the hazards of playground equipment in Chicago and one on football accidents in Broward County, Florida, are examples of such utilization of accident reports.[23]

Reports based on specially collected information include a study of the safety of school cafeterias at Tempe, Arizona, and one of school jurisdictional accidents to pupils in the state of New York. Still another example is the study of teacher accidents in the New York City Schools.[24]

We have been considering accident reports as a means of promoting safe living in the schools. Accident records are also used for other purposes. We have already mentioned insurance in regard to Workmen's Compensation. Special information needed for insurance purposes can be included under "optional data" (see page 109). For liability purposes, there may be some special information needed. The best source of help in this regard is the publication entitled *Who Is Liable for Pupil Injuries?*[25]

Education for Pupils and School Employees

Although this chapter is concerned primarily with the environmental aspects of safety, brief mention will be made of the importance of safety education.

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[23] National Safety Council. "Study of Accidents on Playgrounds and Playground Equipment, Chicago Public Schools." *Sharings*, Spring 1967. (Newsletter of the Elementary School Section, National Safety Council)

Broward County Schools. *Statistical Report of the 1966 Junior High School Football Injuries*. Fort Lauderdale, Fla.: the School System, January 1967.

[24] Kegin, Denis J. *A Safety Survey of the Tempe District #3 in School Cafeterias*. Tempe, Arizona: Bureau of Educational Research and Services, Arizona State University, 1964.

Hase, Gerald J. *Nature and Frequency of Accidents Among Elementary School Children in New York State*. Albany: University of the State of New York, 1957.

Shaw, Frederick. *The Study of Teacher Accidents*. Part I, *Analysis of Teacher Accidents*. Part II, *Suggested Form for Reporting Teacher Accidents*. New York: Board of Education of the City of New York, 1961.

[25] National Education Association, Research Division. *Who Is Liable for Pupil Injuries?* Washington, D.C.: the Association, 1966.

There are several tasks for education in the area of safety. First and foremost is the education of pupils to the end that they will be able to solve accident problems which arise now and in the future. Such education will be an integral part of the curriculum at all grade levels and will be adapted to the interests, needs, and capacities of pupils. The content will relate to the various categories of accidents mentioned earlier, with particular attention at the high school level to driver education. Driver education should include both classroom and behind-the-wheel instruction.

The behavioral outcomes of education are of particular importance in safety education. The need for concern with these outcomes has been expressed in the following words:

> Modern curriculum . . . must not only keep pace with the advances of the physical sciences, but also stay abreast of the concommitant developments of the behavioral sciences: and thus produce students who are not only knowledgeable but who are also able to use their knowledge as healthy citizens acting with full understanding of the newer human dynamics brought about by the radically changing world.[26]

A second area of education is that designed to increase the understanding and competencies of school employees, including teachers, administrators, members of the custodial staff, health and guidance personnel, bus drivers, and others, in the area of accident prevention and safety education.

In-service education in safety is essential for the entire school staff and often can be developed with the use of local resources. Attention can be given to local experiences and policies and to specific problems that employees have faced. Community agencies with concern for various aspects of safety may desirably be invited to participate in in-service education programs.

A Center for Safety Education was established in New York University in 1938. Since then, more than twenty other universities have developed safety centers. Summer seminars for safety education supervisors have already been held in two states. School bus supervisors and school bus drivers may take advantage of excellent educational opportunities offered by many colleges and universities throughout the nation.

The importance of conferences as an educative resource should not be overlooked. At the local level a community or state safety council may organize and conduct a conference that includes sections on school and college safety. Local educational organizations may have speakers on safety at their meetings or may organize a special safety section.

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[26] New England Education Assessment Project. *A Program for Increased Communication and Education.* Woburn, Mass.: Research and Development Center of the Massachusetts State Department of Education, 1966.

Among national conferences concerned with safety education are the annual meeting of the American Driver and Traffic Safety Education Association and the annual congress of the National Safety Council. The scope of the former is indicated by the name of the Association. The congress deals with the entire range of accident problems.

THE COMMUNITY APPROACH

In all areas of the child's development, the school and community may work together to strengthen the work of each other or may work at cross-purposes to tear down what each is trying to do. Conant has pointed out the difficulty of teaching a child to read when little or no reading is going on in the home.[27] There is also difficulty in attempting to teach a child to live safely when home and community teach unsafe practices by example.

The Need Is Clear

An administrative manual of a Midwestern city expresses the need for a community approach in these words:

> Safety is a way of life. Since many of the accident problems facing children have their roots in the home or community, effective safety instruction cannot be confined within the walls of the school building. School, home and community agencies working cooperatively share the responsibility for attacking the problems of safety and safe living.[28]

Guidelines for school-community cooperation in safety have been set forth by a committee of the National Safety Council.[29]

Home safety, traffic safety, and disaster prevention require action on the part of school personnel and community agencies. Recreational safety, from the neighborhood play yard to highly organized sports, is another area needing community-school cooperation. Community commercial, industrial, and public activities have a direct bearing on school pupils. A community planner, when one is available, should certainly be consulted in the selection of school sites and in the establishment of school districts. Consideration should be given to such factors as the location of police and fire stations, of automobile service stations, and other facilities bringing with them unusual or interblock traffic, as well as hazardous rail and air transportation centers.

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[27] Conant, James B. *Slums and Suburbs.* New York: McGraw-Hill, 1961. p. 25.

[28] Cincinnati Board of Education. *Safety in the Cincinnati Public Schools.* Administrative Manual No. 11. Cincinnati, Ohio: the Board, 1964. p. 79.

[29] Hein, Fred V. *How Schools and Other Agencies of Society Can Work Together in Accident Prevention and Safety Education.* Chicago: National Safety Council, 1960.

In light of the known accident hazards that disadvantaged persons face, particular attention should be given to safety measures in low-economic areas. For almost every type of accident, the rate for nonwhites is greater than the rate for whites. The economically disadvantaged in our large cities are primarily nonwhites, and it seems that economic influences may be one factor causing the differences in accident death rates.

There are many hidden factors in school-community cooperation which may have a bearing on the safety education programs of schools. A London psychologist who studied the victims of bicycle accidents reported, "Many children are precipitated into accident involvement by preoccupation with personal problems and a congenital vulnerability to over-react to stressful conditions. We need," she says, "improved methods of detecting stressed children in school and offering emotional assistance to such children." [30] Adequate mental and physical counseling and recreation in the community undoubtedly have an effect on the safety of the children.

Interested Agencies

Fire and police departments share with the school legal responsibility for certain safety procedures, and other agencies may furnish valuable resources for developing or improving the overall school safety program. The interests of some of these agencies are listed below.

Fire department. The fire department usually is legally charged with responsibility for inspecting schools for fire hazards, and boards of education are charged with responsibility for correcting hazards that are identified. The schools are responsible for education regarding fire prevention and protection, but the fire department may helpfully suggest problems to which it feels attention should be given.

Police department. The police department, or a traffic engineer, has responsibility for erecting traffic signs and signals, for painting crosswalks, and for taking care of other matters related to the control of motor vehicle traffic in the vicinity of the school. The school has responsibility for the school safety patrol, although the police department may give helpful guidance. The police department, on the other hand, is responsible for the control of vehicular traffic and for crossing protection. It assigns policemen, school crossing guards, or other qualified adults to supervise and assist pupils at dangerous crossings adjacent to schools.

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[30] Burton, Lindy. "The Child in a Road Accident." *World Organization for Early Childhood Education Newsletter*, January 1966. p. 6.

Practically every organization or group has a contribution to make to traffic safety in the community, and the smooth cooperation of all persons and agencies can pay big dividends.[31]

The community safety council or chapter of the National Safety Council. In a few places the safety agency is an integral part of the town government, but in most communities it is a voluntary group of citizens interested in the improvement of safety in the community. In any case, the school should be represented on the council and work closely with it.

Many councils conduct a Driver Improvement Program, including a Defensive Driving course. This is aimed at improving the driving performance of licensed drivers; in effect it is a refresher course. Many persons connected with the schools can profit from it. The taking of such a course is recommended to parents who participate in "pool" driving or who are in other ways involved in driving schoolchildren.

Local chapters of the American Society for Safety Engineers. The members of this association often furnish valuable help in school safety inspections and in planning new buildings or renovating old ones. In communities where there is no community safety council or chapter of the American Society for Safety Engineers, local industry is often very willing to assist the school through its professional safety personnel.

Local chapters of the American National Red Cross. Although the Red Cross is concerned primarily with such matters as first aid, disaster relief, water safety, and home nursing, it often makes available excellent materials in other areas of safety. Many of its various publications contain safety information. School personnel may find that the local Red Cross staff includes resource people with exceptional abilities in the field of safety.

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[31] National Education Association, National Commission on Safety Education; the American Automobile Association; and the National Safety Council. *Policies and Practices for School Safety Patrols.* Revised edition. Washington, D.C.: the Association, 1966.

Automotive Safety Foundation. *Guide to a School Pedestrian Safety Program.* Washington, D.C.: the Foundation, 1965.

Institute of Traffic Engineers. *A Program for School Crossing Protection.* Washington, D.C.: the Institute, 1962.

Local motor and civic clubs. Many motor clubs and civic clubs support school safety patrols and furnish valuable aid to school programs. In some cases, the patrols are thoroughly outfitted; in others, recognition of their work is provided in the form of hot chocolate on cold days, picnics, or trips to baseball and football games. The Parent-Teacher Association often is extremely helpful in such activities.

Local medical societies. Many medical societies are active in accident prevention programs. Usually their work is channeled through the local safety council, but in places where there is no safety council, or in cases of special interest on the part of the medical society, direct participation in safety activities may occur. Frequently there is special interest in child safety.

Local health departments. In many communities the local health department is actively concerned with accident prevention. This concern is evidenced by measures to prevent accidental poisoning and efforts to teach mothers how to prevent home accidents, particularly accidents to infants and young children. The health department staff may include persons with special competence in numerous aspects of safety.

Professional education associations. Many departments of the National Education Association provide leadership in regard to safety in their particular field of interest as, for example, in science, in industrial arts, in home economics, in relation to field trips by music groups, and in laboratory activities. Each department has an interest in safety and helps to provide its members with up-to-date safety information.

Two groups of the National Education Association are specifically concerned with school safety programs. The National Commission on Safety Education provides general safety materials, conducts conferences, and offers consultation service. It publishes a professional education magazine devoted exclusively to safety, *Safety: Journal of Administration, Instruction, Production.* The Commission serves as secretariat to the American Driver and Traffic Safety Education Association and conducts the National Student Traffic Safety Program.

The American Association for Health, Physical Education, and Recreation, a department of the National Education Association, is interested in many aspects of safety. Its Division of Safety Education works closely with other departments of the parent organization. It conducts meetings on various phases of safety at conventions on district, state, and national levels; publishes materials; and cooperates with other safety organizations and agencies. It is now preparing a textbook on safety in sports,[32] an area in which the Association has particular interest and in which it has provided leadership.

State governmental agencies. Services from state departments of education may be invaluable in planning a safe school building and in integrating safety education into the total school curriculum. In some states, consultants in safety education are available to assist local school personnel. State departments of education frequently work cooperatively with state motor vehicle, labor, and agriculture departments and other state agencies concerned with particular aspects of safety. The activity of state health departments in the area of safety has increased in recent years, particularly in regard to home accident prevention. This department may provide educational materials and consultant services to state departments of education and to local health departments.

For control of the results of disasters, which cannot themselves be prevented at present, some state and federal agencies are particularly helpful.[33] These disasters include tornadoes, hurricanes, blizzards, flash floods, and other bad weather occurrences, and thermonuclear attack. The U.S. Weather Bureau, with its local stations, and similarly the Office of Civil Defense are most helpful in these situations.

FOR FURTHER READING

AMERICAN ASSOCIATION FOR HEALTH, PHYSICAL EDUCATION, AND RECREATION. *School Safety Policies, With Emphasis on Physical*

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[32] American Association for Health, Physical Education, and Recreation. *Safety in Sports: Accident Prevention and Injury Control in Physical Education, Athletics, and Recreation.* Washington, D.C.: the Association, a department of the National Education Association. (In press)

[33] National Education Association, National Commission on Safety Education. *Current Status of Civil Defense in Schools, With Guidelines for Action.* Washington, D.C.: the Commission, 1966.

National Education Association, National Commission on Safety Education. *A Realistic Approach to Civil Defense: A Handbook for School Administrators.* Washington, D.C.: the Commission, 1966.

Education, Athletics, and Recreation. Washington, D.C.: the Association, a department of the National Education Association, 1968.

BOARD OF EDUCATION OF THE CITY OF DETROIT. *Handbook of Safety Regulations.* Detroit: the Board, 1961.

BOARD OF EDUCATION OF THE CITY OF NEW YORK. *School Shop Safety Manual.* New York: the Board, 1965. pp. 3-27.

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BOSTON PUBLIC SCHOOLS. *Safety: Procedures-Programs-Education.* Boston, Mass.: the Schools, 1962.

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HANNAFORD, EARLE S. *Supervisors' Guide to Human Relations.* Chicago: National Safety Council, 1967.

HULT, EUGENE E. "Designing Safety into School Buildings." *National Safety Congress Transactions: School and College Safety.* Vol. 23. Chicago: National Safety Council, 1966. pp. 41-42.

LOS ANGELES CITY SCHOOLS. *Handbook of Safety Rules and Regulations from the Administrative Guide, Los Angeles City School Districts.* Los Angeles: the Schools, 1959.

NATIONAL CONFERENCE ON SCHOOL BUS TRANSPORTATION. *Selection, Instruction, and Supervision of School Bus Drivers.* Washington, D.C.: National Commission on Safety Education, National Education Association, 1965.

NATIONAL SAFETY COUNCIL. *Handbook of Accident Prevention.* Third edition. Chicago: the Council, 1965.

NATIONAL SAFETY COUNCIL. *Safety Education Data Sheets.* Chicago: the Council. (Almost 100 separate sheets on subjects of school safety, produced as need arises and revised from time to time.)

NATIONAL SAFETY COUNCIL. *School Transportation: A Guide for Supervisors.* Chicago: the Council, 1967.

Safety: Journal of Administration, Instruction, Protection. National Commission on Safety Education, National Education Association. Published five times a year.

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Chapter **7**

School Food Services

Food service is now generally accepted as an essential part of a school program. Although lunches were served in many schools prior to the passage of the national school lunch act in 1964, this legislation resulted in an extension and expansion of school food service.

Present-day school food service evolved from previous service functions. One of these functions was to accommodate pupils who could not return home for lunch, frequently a result of the consolidation of school districts. Another function was to help an increasing number of children from homes of working mothers. Moreover, the high volume of traffic in many places made it wise to keep children at school at noon. From its initiation as a program to meet these specific needs, school food service has developed into a highly specialized field of educational activity. It has far-reaching benefits in helping to build strong bodies and alert minds in today's youngsters and in teaching good food habits to tomorrow's adults.

The national school lunch program establishes standards for school lunches. The school district agrees to serve foods that meet certain nutritional requirements; to serve food at as low a cost as possible; to serve needy children free of charge; and to operate the program on a nonprofit basis. In return, the school district is reimbursed with federal funds for part of the cost of food purchased and receives allotments of surplus foods.

The aims of the school food service are to offer meals that meet the nutritional needs of pupils and to develop the potential educational values for better health and nutrition. Properly organized and directed, the school food service plays an important part in healthful school living. Good nutrition promotes health, and health has a direct bearing on ability to learn. After a hungry pupil has enjoyed a suitable meal, he is more alert, can concentrate better, and tires less easily.

A discussion of the aims and characteristics of various types of school food services will serve as a guide to the development of constructive experiences for pupils. Other matters to be considered in this chapter are practices with regard to management, personnel, and financing; standards for nutrition and for facilities; sanitary procedures in food handling; and educational benefits of school food service.

PATTERNS FOR SCHOOL FOOD SERVICE

Food served at school may consist of a complete meal, a variety of foods offered on an à la carte basis, milk or fruit juice, or a full breakfast. The pattern to be used in a particular community should be selected with consideration of the nutritional needs of pupils and the socioeconomic characteristics of the community.

The Complete Lunch

By far, the predominant school food service is the complete lunch, sold as a unit, designated as the Type A school lunch in the national school lunch program.[1]

The nutritional goal of the Type A school lunch is to furnish at least one-third of the recommended daily dietary allowances for children of various age groups according to recommendations of the National Research Council. The Type A lunch requirements provide the framework for nutritionally adequate school lunches. The kinds and amounts of foods listed in the Type A pattern are based on dietary allowances for 9- to 12-year-old boys and girls. As specified in the national school lunch regulations, a Type A lunch shall contain as a minimum—

Fluid Whole Milk:

One-half pint of fluid whole milk as a beverage.

Protein-Rich Foods:

Two ounces (edible portion as served) of lean meat, poultry, or fish; or two ounces of cheese; or one egg; or one-half cup of cooked dry beans or dry peas; or four tablespoons of peanut butter; or an equivalent of any combination of the above-listed foods. To be counted in meeting this requirement, these foods must be served in a main dish or in a main dish and one other menu item.

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[1] U.S. Department of Agriculture, Consumer and Marketing Service. *A Menu Planning Guide for Type A School Lunches.* Bulletin PA No. 719. Washington, D.C.: Government Printing Office, 1966.

Vegetables and Fruits:

Three-fourths cup serving consisting of two or more vegetables or fruits or both. A serving (one-fourth cup or more) of full-strength vegetable or fruit juice may be counted to meet not more than one-fourth cup of this requirement.

Bread:

One slice of whole-grain or enriched bread; or a serving of other bread such as cornbread, biscuits, rolls, muffins, made of whole-grain or enriched meal or flour.

Butter or Fortified Margarine:

Two teaspoons of butter or fortified margarine.

Lesser quantities of the protein-rich foods, the vegetables and fruits, and butter or margarine may be served to children in the elementary grades, provided that such adjustments are based on the lesser food needs of young children.

To help assure that all Type A lunches meet the nutritional goal, it is recommended that lunches include:

A vitamin C food each day, particularly raw vegetables, tomatoes, or citrus fruits.

A vitamin A food twice a week, particularly green leafy or dark yellow vegetables.

Several foods containing iron each day and larger portions of some of these when possible.

The Type A lunch pattern is the basis of eligibility for federal aid under the national school lunch program and helps to bring nutritionally adequate lunches within the reach of the majority of children. To cater to the individual tastes of older pupils and at the same time assure a nutritionally balanced meal, the complete lunch program frequently offers two or more different Type A lunches: a hot-plate meal, a salad cold-plate meal, or a soup-sandwich meal.

A La Carte Programs

Many schools, particularly at the secondary level, offer a variety of foods with each one priced and sold separately. The à la carte plan may result in the selection of a balanced, nutritious meal, but it may also result in an unbalanced meal with a preponderance of carbohydrates and sweets. Where à la carte service is available in conjunction with the complete meal, it is important that the prices of items include the same proportionate ratio for labor costs as the complete meal. Otherwise, à la carte offers undue competition.

Effective education regarding food selection should result in pupils' selecting a balanced diet from the foods offered in the à la carte program. The selections made are, in a sense, an evaluation of the health education that has taken place, particularly at higher grade levels.

Supplementary Dishes

In areas where many pupils bring lunch from home, the school may serve food to supplement sandwiches and other food the pupils bring. Hot foods are no more nutritious than cold ones, but many foods are more palatable if served hot. Where this plan is used, it is important that pupils not consider the supplementary food to be their entire lunch. They need as much guidance in planning the lunch they bring from home as when no supplementary food is offered.

The Home-Packed Lunch

A home-packed lunch can be well-balanced and nutritious. Whether it has these characteristics depends to a great extent on parents' understanding of pupils' nutritional needs and their ability to provide and prepare a good lunch. Teachers can often influence the choice of foods which are brought. Through discussion of food requirements with pupils and parents, they can help pupils bring lunches that meet, or closely approach, nutritional needs.

Serving Milk or Fruit Juice

Schools which serve milk, fruit juice, or tomato juice may well consider scheduling this procedure soon after school opens or in connection with the noonday lunch. Some physicians believe that it is best for children to be served milk only at regular mealtimes. Milk served at recess periods may interfere with pupils' appetites for lunch, whereas service near the opening of school may help compensate for inadequate breakfasts.

The type of milk to be served should be determined locally by health authorities, nutritionists, and physicians. Although in the past it has been common practice to serve only whole milk, qualified persons now recommend low-fat milk for many children. Since the sweetness of chocolate milk or chocolate drink may lessen the appetite for other foods, the serving of these drinks should be discouraged.

Dietary studies show that vitamin C foods are low in the average diet. Serving orange juice or tomato juice is an excellent way to supplement the diet with respect to this nutrient.[2]

Serving Breakfast

Some pupils may arrive at school without having eaten breakfast, or after having eaten an inadequate breakfast. When this occurs in extremely low-income areas or is associated with very long bus rides, schools may seek assistance to operate a school breakfast program with funds provided under the Child Nutrition Act, enacted by Congress in 1966. The three basic components of the breakfast are one-half pint of milk, one-half cup fruit or vegetable juice, and one serving of a cereal product. A protein-rich food such as one egg or one ounce of meat, fish, poultry, or peanut butter is to be included whenever practicable.

Where many pupils fail to eat desirable breakfasts at home, schools may direct educational efforts toward familiarizing both parents and pupils regarding the importance of a good breakfast. In some cases inadequate breakfasts are due to pupils' not arising early enough to eat breakfast before leaving for school. In other instances, parents fail to provide breakfast. If the lack of breakfast is due to financial problems, the aid of a social agency should be requested.

When parents can afford to do so, they should provide breakfast for children, and school personnel should help them to realize their obligations and privileges in this respect. The school should not take over the rightful responsibilities of the parents unless such action is necessary to prevent harm to a particular child.

Vending Machine Service

The widespread use of vending machines in public places, in industry, and in commercial establishments has caused some persons to suggest that these machines be used to dispense food in schools. Such a procedure merits careful consideration. Vending machines provide an impersonal service, assure equal servings for all, and can be located so as to be easily accessible. On the other hand, vending machines are usually limited in the kind of foods dispensed. For example, no machine has yet been devised that will rapidly dispense a variety of Type A lunches. Furthermore, vending machines are often operated as a concession, with the concessionaire making a profit from the operation. This is contrary to the generally accepted philosophy that an individual or firm should not be allowed to profit from the sale of food to pupils.

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[2] U.S. Department of Agriculture. *Food—The Yearbook of Agriculture.* Washington, D.C.: Government Printing Office, 1959.

ORGANIZATION AND ADMINISTRATION OF SCHOOL LUNCH PROGRAMS

School lunch programs operate under policies adopted by the board of education and under the administrative leadership of the superintendent of schools and school principals. These persons need to establish policies and procedures relating to the type of food service, type of management, employment practices, financing, scheduling of eating periods, and provision for school lunch supervision.

Opinions vary as to whom the lunch program is intended to serve. In rural areas, where large numbers of pupils may come to school by bus, the program is generally accepted as available to the total enrollment. Urban communities with neighborhood schools sometimes adopt a policy of limiting lunch service to those who live beyond a prescribed distance or come from homes where no adult is available at noontime. However, many schools extend lunch service to the total enrollment regardless of the school's proximity to homes. The rationale for this is that a lunch program is an accepted part of the total educational program and that the benefits should be available to all.

Full and proper use of the school lunch will not be realized unless pupils are taught to appreciate the quality and low cost of the school lunch and its superiority to foods offered by many street vendors. Sweets and carbonated beverages are not satisfactory substitutes for a good lunch.

It is noteworthy that the American Dental Association has issued a statement that an educational campaign should be conducted to reduce the frequency of consumption of sweets in the diets of all children, with special attention given to the elimination of the sale of sweets in schools.[3] Along a similar line, the Council on Foods and Nutrition of the American Medical Association "is particularly opposed to the sale and distribution of confections and carbonated beverages in school lunchrooms" and states that "the availability of confections and carbonated beverages on school premises may tempt children to spend lunch money for them and lead to poor food habits."[4]

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[3] American Dental Association. "Dental Health Program for Children." *Journal of the American Dental Association* 74: 330; February 1967.

Type of Management

The preferred plan of operation is for the board of education to employ all personnel, exercise financial control, and assume the same responsibility for the lunch program that it does for all other school functions. Because the school food service program represents a complex educational and business operation, it is imperative that professionally qualified persons administer this program.

A school lunch manager or director should meet the requirements recommended by professional associations concerned with this aspect of education. A joint association committee has recommended desirable qualifications for school lunch directors and managers.[5] These include a bachelor's degree in home economics from an accredited college with major emphasis in institution management and foods and nutrition, complete with courses in education; three years' experience in food service administration; and desirable personal characteristics. Where school lunch managers do not meet the educational requirements, an approach to them should be made within a reasonable time.

In some communities a parent-teacher organization or other community group is granted permission by the board of education to initiate and operate the lunch program on a nonprofit basis until such time as the board can assume management. Many programs were started in this fashion, with nonschool groups providing food, equipment, and countless hours of volunteer service. However, the National Congress of Parents and Teachers has, for some years, de-emphasized the operational responsibilities of member units in lunch programs in favor of a role of interpretation to the community and cooperative assistance.

Forms of management not under the active control of the board of education are not consistent with good administrative practice. This refers particularly to granting a concession to a catering service or an individual to conduct the program for personal gain. A concessionaire is privileged to set the salaries of employees and the prices to be charged pupils. Under this arrangement the financial status of the program may be completely unknown to anyone except the operator, making the school lunch nothing more than a private restaurant on public premises. Furthermore, outside food service operators are ineligible for federal cash assistance and surplus foods, resulting in higher prices to pupils. This type of program is in no way conducive to providing a desirable learning situation; it is entirely too removed from the concern of the school faculty.

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[4] American Medical Association, Council on Foods and Nutrition. "Confections and Carbonated Beverages in Schools." *Journal of the American Medical Association* 180: 92; June 1962.

[5] Association of School Business Officials and American School Food Service Association. *The School Food Service Director.* Denver, Colo.: American Food Service Association, 1965.

Health Supervision of Workers

All personnel, regardless of function, should possess good health and be familiar with food sanitation practices. The following recommendations, applicable to all who prepare or serve food, should be followed in all schools:

1. Daily supervision by competent personnel is essential to make certain each employee is free of symptons of a communicable disease, open or infected cuts, burns, sores, or other skin conditions which may contaminate food. The prevention of foodborne infection and poisoning requires daily attention to the health of workers. Workers should be trained to recognize danger signals in themselves and to take responsibility for protecting others. Some one person within the school, or school system, should have authority to excuse from service any food handler who is a menace to the health of others. Provision should be made for substitute food service workers and sick leave for the full-time food handler.
2. Pre-employment medical examinations should include a chest X-ray to show freedom from active tuberculosis. Thereafter, throughout the entire period of employment, a periodic medical examination including a chest X-ray is a desirable health measure for food handlers as for all school personnel. From the point of view of food handling, however, these measures are secondary in importance to daily supervision and in themselves may give a false sense of security.
3. Clean personal habits are required for both hygienic and aesthetic reasons. Clean uniforms and hairnets and trimmed nails are indicative of attention to careful grooming. Fingers should be kept away from the hair, face, and out of the mouth.[6] A

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[6] National Education Association and American Medical Association, Joint Committee on Health Problems in Education. *Health Aspects of the School Lunch Program.* Washington, D.C., and Chicago: the Associations, 1962.

wall-mounted dispenser at the hand wash sink containing a 5 percent hexachlorophene solution is highly recommended. One or two drops rubbed into the hands after washing gives hours of residual protection against contamination.

Since food sanitation habits are easier to form than to reform, it is wise to train new employees in sanitary principles related to their jobs as they are being shown how to do their work, whether it be washing pots and pans, preparing vegetables, or making ham sandwiches.

Written rules to govern food handling practices should be posted and strictly enforced. Such rules should include the following instructions:

1. Do not report for duty when suffering from a cold or other illness.
2. Follow instructions for storing hat, coat, and purse.
3. Wear a clean uniform, or washable dress and apron, while on duty. Omit jewelry.
4. Wear a hair net or clean washable cap (for men employees) at all times while on duty. Keep extra nets on hand.
5. Keep fingernails short and clean.
6. Wash hands thoroughly and often, always after using the toilet or touching the face, nose, or hair.
7. Observe clean work habits by—
   a. Keeping work surfaces and equipment clean.
   b. Using a separate spoon for taste testing.
   c. Handling silverware by the handles.
   d. Handling dishes by the rims.
   e. Carrying glasses and cups with the fingers on the outside.
8. Workers with infected cuts or sores must not handle food, utensils, or dishes from which food is eaten.

On-the-job training is one of the best ways to train workers in the skills and techniques of sanitary and safe food handling practices. Because of the large number of persons to be reached and because of limited resources and time available, a group method is generally used. This may take the form of staff meetings where problems are discussed and ideas are pooled. Such meetings develop morale and stimulate employees to improve their work performance.

Workshops and conferences are other valuable means of training. Most state departments of education and many state universities conduct institutes or conferences on school lunch procedures and problems. School lunch workers, especially those not under trained direction, should be encouraged to attend such programs. Food service specialists at these meetings bring professional help to all engaged in school lunch programs. Many municipal health departments run food handling schools for employees of public and private eating places.

Successful completion of food service training courses, offered continuously in all major areas of food preparation service and management, will in time give participants accreditation and can become a requirement for employment. Development of such a recognized training program is an excellent way of guaranteeing good food service performance in the years to come.

School Lunch Finances

The school lunch should be operated in a sound financial manner, but without profit. The income from the operation should not exceed the cost of food, wages, and other expenses directly incurred in providing such services. Sound financial practice turns any cash balance back into the program to provide for improved quality of meals, better facilities, or a lowering of the meal price.

Financially sound school lunch programs are the result of businesslike operations. To reflect the financial status of operations, a profit and loss statement should be drawn up monthly or quarterly and submitted to the superintendent and the board of education. As public money is involved, school lunch programs are generally subject to audit as part of a total school audit. This procedure encourages good bookkeeping and approved banking practices.

Prices that must be charged for school lunches depend partly upon whether board of education funds or lunch program funds pay for part or all of the salaries of lunchroom workers and employee benefit costs. By far the most prevalent scheme is for the school lunch operation to be primarily self-supporting with federal help in the form of cash reimbursement and donated foods. With this plan, all food costs, labor, and miscellaneous expenses are met. A growing practice, particularly with the larger programs or centralized systems, is for the salary of the manager or director to be paid out of school funds. As this person is employed to assure the quality of the program, his salary is considered an appropriate expenditure of school money. In a small number of school lunch programs, the entire labor cost is underwritten by the board of education, permitting the sale of lunches for just the cost of the food.

Providing needy pupils with meals, or arranging meals at reduced rates, is a sound procedure for school food services and is a requirement for participation in the national school lunch program. The classroom teacher, school nurse, and school social worker assist the principal, perhaps through home visits, in determining which pupils need help. Obviously, needy cases should be considered individually and confidentially. Offering free lunches to certain children may cause embarrassment to both the pupils involved and the school staff. In view of this, parents of needy pupils may be asked to pay what they can afford, such as the cost of the food in the lunch. This frequently works out to the benefit of all. Since lunches from which a full income is not derived represent a financial loss, the board of education or some local organization must contribute funds to cover their cost.

School Lunch Supervision

Regardless of how excellent the food or how well-managed the program, the school lunch will remain a feeding service and not attain its education potential unless it has faculty cooperation backed by the administration. Beneficial lunchroom experience begins in the classroom with a discussion of what is expected in table manners and social conduct. With this preliminary guidance there are several ways in which the lunchroom can be effectively supervised:

1. Each teacher may lunch with his class. This is particularly desirable in the lower grades, but necessitates arrangements by which each teacher will have some time during the day for relaxation and relief from contact with pupils.
2. One or two teachers may supervise the entire lunchroom service on a rotation basis. Teachers who supervise the lunchrooms should have a free period for eating their own lunches and for relaxation.
3. Student supervision may be planned through the student council. With proper guidance, self-government in the lunchroom can be organized so as to be highly effective and satisfying to students and teachers alike.

Arrangements for lunchroom supervision in a particular school can best be developed through cooperative study by the principal, teachers, and school lunch manager. It is important, however, that every teacher be given some duty-free lunch time.

A recent study of the National Education Association[7] gathered considerable information regarding teacher supervision of lunchrooms. Data from Table 1 reveal that of 616 school systems enrolling 300 or more pupils a rotating plan was the most common form of lunch period supervision. According to the findings, "Teachers

TABLE 1 | DUTY-FREE LUNCH PERIODS FOR TEACHERS, 1966

Item	Total, all systems enrolling 300 or more pupils	School systems, by enrollment group		
		25,000 or more	3,000–24,999	300–2,999
DUTY-FREE LUNCH PERIOD EVERY DAY				
Elementary	20.3%	30.0%	24.4%	19.0%
Persons responsible for pupils during lunch[a]				
Teacher aide	53.4	68.9	61.4	50.0
Clerical or other school personnel	32.5	20.0	10.5	40.9
Student monitor	1.6	...	...	2.3
Pupils go home	13.0	13.3	17.5	11.4
Other	4.5	4.4	10.5	2.3
Secondary	28.0	29.3	30.8	27.2
Persons responsible for pupils during lunch[a]				
Teacher aide	23.1	27.3	30.6	20.6
Clerical or other school personnel	45.9	54.5	50.0	44.4
Student monitor	6.5	20.5	11.1	4.8
Pupils go home	8.8	4.5	6.9	9.5
Other	0.7	4.5	2.8	...
LUNCH DUTY ON ROTATING BASIS				
Elementary	52.3	39.3	47.4	53.9
Secondary	41.0	35.3	35.5	42.7
ALL TEACHERS RESPONSIBLE FOR SUPERVISING PUPILS DURING LUNCH EVERY DAY				
Elementary	19.1	22.7	16.2	19.8
Secondary	5.1	2.7	5.1	5.2
OTHER				
Elementary	4.5	6.7	8.1	3.4
Secondary	12.1	30.0	18.8	9.9
NOT APPLICABLE OR NOT INDICATED				
Elementary	3.8	1.3	3.9	3.9
Secondary	13.8	2.7	9.8	15.0

Source:

National Education Association, Research Division. "Teacher Supervision of Lunch Periods." *Research Bulletin* 45: 73; October 1967.

[a] Percent of systems reporting a duty-free lunch for teachers.

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[7] National Education Association, Research Division. "Teacher Supervision of Lunch Periods." *Research Bulletin* 45: 72-74; October 1967.

in American public schools are still far from the goal of a free and unharried lunch period. In general, conditions are better in the large systems than in the small systems." The study found that the use of teacher aides was the most common plan for freeing teachers from supervision duties during lunch.

Scheduling Lunch Periods

Scheduling should include time for handwashing, for securing food, and for eating leisurely. An allowance of 20 minutes at the table is advised in elementary schools, and 15 minutes in secondary schools. An additional 10 minutes is desirable for hand washing and passing to and from the lunchrooms. Insofar as possible, 11:30 should be the earliest hour to serve and 12:30 the latest, with younger pupils being served first.

To eliminate long lines at the service counter, class dismissals staggered at about five-minute intervals, depending on service time, are recommended. This practice permits a continuous flow of students to and from the lunchroom. In the departmentalized programs of secondary schools, periodic dismissals in waves cause a break during a class period for approximately one-third of the students. Reduction of time wasted by pupils waiting in line and prevention of overcrowded lunchroom conditions merit this disruption.

When staggered dismissals are not used, one or more shifts may accommodate the number to be served according to the seating capacity of the dining area. Three shifts are the maximum possible within desirable time limits.

APPLYING PRINCIPLES OF SANITATION

Careful application of food sanitation principles is essential for health protection and for education. Adequate space is required for preparing and serving food as well as for eating. Kitchens need appropriate equipment, including suitable provision for dishwashing. In all procedures involving the handling of food, care must be taken to avoid its contamination.

Maintenance of hygienic conditions requires close cooperation among health officers, school authorities, and school lunch managers. In most states, the department of health promulgates standards for food sanitation. The school medical adviser, medical director of the local health department, and other persons responsible for sanitary conditions in schools apply the standards adopted by the legal authority. Periodic inspections should be made of facilities and procedures, with written reports submitted to the superintendent of schools. Where qualified personnel are available, these inspections may be made by sanitarians of the local health department.

Space Requirements

Adequate school lunch space includes an eating area sufficient in size to assure comfortable, uncrowded conditions; kitchen space for the preparation of food; storage facilities; a serving area; and a dishwashing area.[8]

The kitchen, dining, and storage areas should be located on the first floor, conveniently accessible to school corridors, exits, the service driveway, and parking areas. The entire unit should be adaptable to independent use by an arrangement for closing it off from the rest of the school. Complete separation of the kitchen and eating areas is desirable. This may be accomplished in small schools by a panel opening from the kitchen to the service area, or a separate service room may be provided.

Lunchroom Equipment and Construction

The lunchroom should be large enough to accommodate the total enrollment in not more than three seatings and to provide a minimum of 10 to 12 square feet per person seated at one time. Small tables are preferable to large ones. The 40-inch square table in combination with a few round tables is considered best for development of table conversation and for flexibility of table arrangement. The 6-foot rectangular table is next best. Tables of a longer length give the lunchroom an institutional appearance and are apt to increase noise from cross conversation. Tables 29 inches high appear to be most satisfactory for all-round use. Chairs are preferred to benches, and in the secondary school it is desirable to provide chairs which have book shelves beneath them. Otherwise book shelves should be provided in access corridors.

Construction materials used for walls and floors should be selected with consideration to ease of cleaning, good color combinations, and pleasing effect. Table tops, draperies, and other room decor should be related. Acoustical treatment of ceilings, adequate lighting, and proper ventilation are important factors in developing pleasant and healthful surroundings.

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[8] U.S. Department of Agriculture. *Layout, Equipment, and Work Methods for School Lunch Kitchens and Serving Lines.* Marketing Research Report No. 753. Washington, D.C.: the department, December 1966.

Classroom Lunches

Eating in classrooms is not recommended but sometimes is necessary because no dining room is available. This procedure creates major problems in sanitation. The chief disadvantages are the housekeeping problem of cleaning up crumbs and spillage, the possible need of additional service when the kitchen is remotely located, the difficulty of transporting food from one floor to another in multistoried buildings, and the necessity of greater teacher supervision.

Serving Facilities

The plan and arrangement of lunchroom service facilities should be designed to route traffic from the school corridor to the service counter, to tables, to soiled dish return, and back to the corridor. Space is needed to accommodate pupils lined up at the service counter.

The number of counters required depends on the total meal load and the way that load is distributed. In general, a single service counter is needed for serving each 100–150 pupils at one time. Where more than two counters are installed, one is sometimes used exclusively for cold food, such as milk, sandwiches, and ice cream. However, it is thought to be good practice to have all students pass by the hot food counter in order that they may see the kind of food that is available and possibly be induced to buy a complete lunch rather than just a bottle of milk or some ice cream. Mobile service counters are frequently used where additional stations are needed.

The Kitchen and Its Equipment

In specifying space and facilities needed for the school lunch program, it is important first to ascertain the ultimate enrollment of the school. Using this figure, estimate that 50 percent will be potential lunch customers, unless existing history of participation indicates otherwise. The 50 percent participation might be altered in the following ways:

1. A large percentage of students commuting by bus might increase meal load.
2. A neighborhood school might well have fewer pupils staying at school for lunch.

3. Selling à la carte items in addition to complete lunches usually decreases participation in lunches up to 25 percent and lessens the need for equipment.

An overall allowance of 3 square feet per complete meal served will provide sufficient area, allocating 2 square feet for kitchen functions, and one-half square foot each for food storage and service area.

Arrangement of the various areas of work should allow for the flow of materials in logical sequence, from the receiving of supplies to their storage (either dry or refrigerated), to preliminary preparation, final preparation, serving, dishwashing, and, finally, refuse disposal.

Particular attention should be given to the construction features of the kitchen. Important conditions are acoustical treatment of the kitchen ceiling, 30 footcandles of illumination at all work areas, and use of hooded equipment (with grease filters and exhaust fan) over cooking areas. A separate hood should be installed for dishwashing machines. Sanitary finishes of walls should be provided through use of glazed structural tile, glazed brick, or waterproof hard plaster. Quarry tile is preferred for kitchen floors. Good control of room temperature is essential, particularly for areas that become hot or humid. All doors and windows should be screened. Construction specifications should eliminate seams in equipment wherever possible. Wall-hung fixtures require less cleaning time than floor-mounted fixtures.

A minimum of one-fourth cubic foot of refrigeration is needed for each complete meal served and an equal amount of 0° F. freezer storage. This does not include refrigerated storage for half-pints of milk. A walk-in refrigerator is necessary when the meal load is 350 (sometimes less), supplemented by a reach-in refrigerator. A level passageway connecting the kitchen and the walk-in refrigerator enables mobile equipment to be rolled in and out.

Dry food storage space preferably should be located at an outside wall to permit fresh air ventilation by means of a 2- or 3-foot louvred opening near the ceiling. Adjustable metal shelving is more sanitary than wood shelving. Uninsulated heating pipes, water heaters, refrigeration condensing units, or other heat-producing devices should be kept out of the storeroom; the best room temperature for dry food storage is 40° F. to 70° F.

Garbage disposals, if provided, do not eliminate the need for waste cans with tightly fitting lids. These waste containers should be emptied and cleaned daily.

A planning area is important even in the smallest kitchen, and also some facility for storing workers' wraps and handbags, lest they be kept in the kitchen. The kitchen should have a separate sink for washing hands so located as to encourage frequent use.

Safety needs careful consideration. Immediate mopping of floors on which food or water has been spilled avoids slippery areas which could cause falls. Precautions should be taken to avoid fire hazards or injuries because of the location, design, or condition of the lunch area or facilities. Multiple exits are needed. Fire extinguishers of an approved type and a fire blanket should be provided.

Preparation and Serving of Food

Healthy workers, good work habits, and clean equipment and utensils are basic to sanitary food handling. What the worker does or does not do may be the link in the chain of transmission of infection.

Closely related to personal hygiene is the condition of equipment used in food processing. Clean hands will not prevent contamination resulting from unclean equipment such as grinders and slicers and dirty food containers. However, food handlers cannot be held responsible if the equipment they are using is literally uncleanable. Management should take steps to replace poorly designed or improperly installed equipment in both preparation and serving areas.[9]

A clean environment is a matter of good housekeeping and is related to the sanitation responsibilities of both the custodian and the food handlers. A schedule of cleaning should define when, how, and by whom each item is to be cleaned. The cleaning of floors, walls, and the employees' dressing room and the washing of garbage cans are frequently part of the custodian's duties. The food service workers' duties should include such daily jobs as cleaning all power machinery after use and washing towels; such weekly jobs as thorough cleaning of the range and refrigerator (defrosting if necessary); and such monthly jobs as thorough cleaning of the storeroom. Good housekeeping helps to control pests. No amount of insecticides and no extermination program can overcome the effects of poor daily housekeeping and poor building maintenance.

Wholesome food cannot be prepared if it is contaminated before delivery to the kitchen. The manager should be concerned with the condition of all food products purchased. He should see that frozen foods are undamaged, staple food uncontaminated, and produce fresh.

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[9] National Sanitation Foundation. *Standard No. 2, Food Service Equipment.* Ann Arbor, Mich.: the Foundation, 1952.

Prompt and adequate refrigeration is one of the best means of preventing the increase of infectious organisms and the production of toxins which might cause illness. For this reason, processed food should never be allowed to stand at room temperature. Food needing refrigeration should be given prompt attention.

Food offered for sale can be safeguarded from contamination by use of a glass front above the counter and protection shields on all display shelves. Food should not be touched with the fingers. A preferred procedure is the use of disposable polyethylene gloves or the use of suitable serving tools, such as tongs, spoons, forks, or spatulas. Holding time for food in steam or hot food tables should be kept to an absolute minimum. Food should be placed on clean plates or napkins and not served on a bare tray. Chipped or cracked dishes should be thrown away. Silverware should be dispensed by the handles to prevent contamination. Milk must be served in its original container or served from bulk dispensers of a design approved by health authorities. (This frequently is a legal requirement.) In any case, milk must be kept refrigerated until served. Wrapped straws or approved straw dispensers should be used.

Dishwashing Procedures

Lack of adequate dishwashing facilities and unsatisfactory dishwashing procedures create one of the major health hazards in school food service. Dishes, silverware, and cooking utensils must be thoroughly washed and sanitized either by hot water or by a chemical sanitizing agent. In many schools, hard water makes careful selection of a detergent necessary. Dishwashing procedures should comply with regulations of the state and local health departments.[10]

A three-compartment sink is needed when dishwashing must be done by hand. After dishes are scraped and prerinsed to remove food particles, they are stacked and placed in lightweight metal baskets. The first compartment is for the detergent wash; the second for the rinse. Dishes are transferred to the third compartment for sanitizing. For the latter process, the water should be heated to 180° F.

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[10] U.S. Department of Health, Education, and Welfare, Public Health Service. *Instructor's Guide—Sanitary Food Service.* Public Health Service Publication 37. Washington, D.C.: the Service, 1952. pp. 70-71.

A dishwashing machine is helpful in all situations, and particularly desirable when the meal load is in excess of 150 meals per day. Two-tank washing machines enable more effective washing and sanitizing than one-tank machines. All machines must have attached metal tables sufficiently large to permit loading the soiled dish racks and draining the clean dishes. A prerinse sink or built-in prerinse section to the machine is highly desirable. Thermometers should be checked to make sure that the water is 140° F. during the washing period and 180° F. for the rinsing. General practice is to allow 45 seconds for washing and 15 to 20 seconds for rinsing. The washing solution should be kept at the proper strength. For satisfactory air-drying, plastic dishes require a slightly higher wash temperature and longer rinse period than china, because they are slow in absorbing heat.

A booster heater, located as close to the dishwasher as possible, is a means of providing an adequate supply of sanitizing rinse water at a temperature of 180° F. Automatic devices for controlling the wash and rinse cycles and the detergent supply are economical investments that assure efficient sanitary operation.

Regardless of the method of washing, dishes should never be toweled. Chemical agents and special equipment now on the market permit dishes and silverware to be air-dried without becoming spotted.

All-paper service is coming into extensive use in the schools, especially where investments have not already been made in dishwashing machine equipment. Use of paper provides an economical and sanitary system that eliminates dishwashing problems. Before a paper service program is instituted, careful consideration should be given to ways of disposing of increased amounts of waste paper.

CAPITALIZING ON LEARNING OPPORTUNITIES

Successful realization of the many learning opportunities inherent in the school lunch depends on the efforts, attitudes, and cooperation of all who are concerned with the work of the school. Teachers, pupils, and lunchroom personnel have particularly important roles.

A Health Education Laboratory

Pupils' education is enhanced when the school lunch is used as a laboratory for teaching food values, consumer costs, social customs, and sanitary principles related to food handling and preparation.

From firsthand experience with a school lunch, pupils learn about nutritionally adequate meals and the contribution of the noon meal to their daily food needs. They are then better able to understand how to complete their daily food needs at breakfast and the evening meal.

Student involvement in menu planning is a fruitful way to create interest in the school lunch, while teaching nutrition. A committee of students furnished with lists of main dishes and accompaniments that are within the food budget can assist in menu selections. Students may suggest favorite family dishes that might not be considered otherwise. For example, a student committee in one school decided to include barbecued pork chops in the menu; another time spareribs and sauerkraut. Lasagna and salad plates were requested by girls.

Schools can and should serve meals typical of the ethnic groups in their population and provide for the differing needs of boys and girls between the ages of 12 and 16. The boys want and need hearty meals, while the girls tend to be weight-conscious and enjoy salad plates. Available menu planning guides can group iron-rich food sources along with the vitamin A-rich and vitamin C-rich foods to assist in meeting nutrition requirements.

The Castro Valley School District of California developed a popular "School's Choice" program designed to increase pupils' knowledge of food and nutrition. A different class plans the menu each month, with guidance from the teacher and the cafeteria manager. Before starting to choose and plan the meal, the requirements for a well-balanced meal are discussed.

Pupils may develop good practices, such as handwashing before eating, if these practices are incorporated into the daily routine. This is best accomplished when a gang washstand or a battery of lavatories is conveniently located near the entrance to the lunchroom, is supplied with ample soap solution and towels, and is supervised. Desirable attitudes toward food, wise food choices, mannerly eating, good social behavior, and democratic living may be gained through participation in various lunchroom activities.

The role of pupils should emphasize various types of learning. Utilizing pupil help for kitchen duties should be scrutinized for actual instructional benefit, lest this questionable practice be interpreted as exploitation. Assignments should be rotated among all for whom such activity is appropriate, and each pupil should be given instructions to help him perform his duty well and safely.

Organized classes in food service training are being widely offered in secondary schools to students who might otherwise become "dropouts."

Many teachers understand the educational potentialities of the school lunch program. They are finding more and better ways to make pupil experiences in food selection an integral part of classroom teaching. The possibilities for coordinating classroom instruction with lunchroom experiences are limited only by imagination and willingness. The extent and nature of this teaching will vary with the age levels of pupils. Faculty planning is advised to avoid overlapping of teaching at different levels and to ensure a broad coverage.

A pleasant word from the workers at the serving counter can improve the pupil's enjoyment of his lunch. Pupils respond to the stimulus of tasty foods attractively served by friendly people. A suggestion to "try just a little and tell me whether you like it" may encourage pupils to taste foods with which they are unfamiliar.

Community Implications

Through periodic contacts with the program, the community becomes increasingly aware of the role of the school lunch as a means of health education. From newspaper publicity or from firsthand observation, parents may become deeply interested in the manner of operation of school food services and their inherent potentialities for teaching nutrition. Informal meetings of parents offer an opportunity for an exchange of information about children's health, growth, and nutrition. Study groups of a more formal nature may seek a qualified instructor for discussion of such topics as—

Basic principles of good nutrition
Food needs of children and adults
The contribution of the school lunch to daily food needs
Better food buying practices.

The cooperation of the home and school in developing good food habits and good attitudes toward healthful living may result in improving the quality of living in the community. Specialists from community health agencies are available as resource persons.

Occasionally, school food services are called upon to provide special meals for either school-affiliated groups or outside groups in the community. This is good public relations as it gives public groups the opportunity to become better acquainted with schools. However, such meal functions should not attempt to undersell the neighborhood eating establishments. If permission is granted for an outside group to use the kitchen, it should be allowed only if one of the regular staff is employed to be in charge.

The school lunch program is more than a method of providing appetizing, well-balanced meals. If the program is limited to these objectives, many learning opportunities will be bypassed. For, with school support and proper management, the program serves as a laboratory for healthful school living. Furthermore, these daily experiences, wisely directed, are recognized measures for strengthening personal, family, and community health standards.

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Chapter **8**

School Facilities and Health

School buildings of the past were usually single-room rural schools or, in larger communities, a series of identical boxlike rooms. Although codes were established to protect the educational program and the health of pupils, these frequently listed only minimum standards, many of which were based on empirical knowledge.

Room units in the oldtime school were approximately 22 by 30 feet. The width of the room, 22 feet, was about twice the window height and so natural light penetrated the interior of the classroom. Seating was fixed and arranged in rows so that natural light was admitted on the pupils' left. Except in a few isolated instances, little attention was given to the needs of pupils as total functioning organisms.

Things are different today. Now it is recognized that every experience of children and youth and every aspect of the environment in which these experiences take place may leave an imprint on their personalities. Classroom experiences and school environmental conditions affect the physical, mental, emotional, and social lives of pupils. Their health and ability to learn are adversely influenced by furniture that is too large or too small, air that is too hot or too cold, lighting that causes glare, unbalanced color schemes, and a host of other factors.

No longer is it sufficient that a school building comply with minimum requirements for shelter, heating and ventilation, and space for teaching; it should provide an environment that encourages good teaching, protects health, and fosters appreciation of beauty in form and color.

Certain aspects of school buildings so obviously and so greatly affect the health of pupils and teachers that entire chapters are devoted to them. This is true of lighting and acoustics (Chapter 9), air conditioning, heating, and ventilating (Chapter 10), and water supply and waste disposal (Chapter 11). Other matters relating to school buildings are not so obvious, although their effects on health

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may be great. These less obvious factors relate to the selection of a building site, school planning procedures, the design of the school building, and the arrangement and location of the school health unit. This chapter will deal with these topics and also present some ideas on school facilities for the future.

SITE SELECTION AND UTILIZATION

In planning school facilities, attention needs to be given to both the school building and the site on which it is located. The first consideration in choosing a school site relates to pupil population, present and projected. Every means possible should be used to estimate the length of time that the site will be used and the changes in pupil population that will occur during that period of time. Sites may lose their usefulness for school purposes over a period of time, particularly in fast-growing communities.

Factors affecting health and safety include surface drainage and impending industrial or highway developments which might surround the school and create such obnoxious or unsafe conditions as odors, smoke, noise, and traffic hazards. Zoning authorities, city and county planning officials, and realtors should be consulted before a decision is made to purchase a site.

After a site has been selected, careful attention should be given to locating the building on it and to effective utilization of parts of the site not used for the building.

Walking Distances

Proper walking distances should be established, considering the presence or absence of sidewalks and road and traffic conditions. For elementary school children, walking distance usually will not exceed approximately one-half mile. Children are physically able to walk farther than this distance, but in so doing young ones may become fatigued or may spend a disproportionate amount of time going to and from school. Reports of traffic accidents involving young children reveal that most accidents occur beyond the half-mile range. In cities, placing schools at one-mile intervals tends to keep enrollments at a reasonable size.

Secondary school pupils can usually walk to school if the distance is no more than a mile or a mile and a half. Exceptions need to be made for certain physically below-par or handicapped children. Bus transportation may be provided for such children and for those who do not live within a reasonable walking distance from the school. Buses may also be used to carry pupils from one community or section of a community to another to provide heterogeneous groupings or to equal school enrollments.

Some communities have found it desirable to mark lanes on streets and highways to indicate safe areas for pedestrians and bicyclists. This practice protects children and youth and encourages desirable physical activity.

The Site Size

The size of a site for a proposed school building will be determined by the board of education in consultation with representatives of the state department of education. State school codes often include a minimum standard for building sites and the National Council on Schoolhouse Construction has developed recommended standards.[1]

Standards change from time to time and also from state to state. For this reason it is impossible to list standards that are universally accepted. The following site sizes, however, are generally considered desirable.

SIZE OF SITE FOR SCHOOL BUILDINGS

Type of School	*Recommended Site Sizes*
Elementary	10 acres, plus one additional acre for each 100 pupils
Junior High School	20 acres, plus one additional acre for each 100 pupils
Senior High School	30 acres, plus one additional acre for each 100 pupils

Some states advocate larger school sites, and the trend throughout the country over the past few decades has been toward larger sites for all types of schools.

Traffic Factors

Every effort should be made to select a site away from railroads, airports, water hazards, and heavily traveled roads. Pupils should not have to cross main highways to reach school. However, traffic patterns change frequently and a building usually cannot be abandoned because of changes in traffic. If necessity forces the selection of a site contiguous to a main highway, or rerouting brings traffic near the school, protective measures must be taken. Many cities provide civilian traffic aides who, although not police officers, have responsibility for directing traffic near a school, reporting violations of safety and traffic regulations, and assisting pupils across intersections. Women are frequently employed as traffic guards. Some cities provide traffic lights at intersections near a school which pupils can operate through the use of push buttons.

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[1] National Council on Schoolhouse Construction. *Guide for Planning School Plants.* East Lansing, Mich.: the Council, 1964.

Where a school is near a heavily traveled highway, pedestrian entrance to the highway may be barred and a suitable subway or overpass provided.

If traffic noise causes disturbance, a degree of relief may be had by shrubbery plantings, board fences, or other sound interceptors or deflectors.

Drainage

A site should be so graded that there is no evidence of standing water after a rain. Engineers should survey the site and provide the contractor with proper gradients for the area. If the site has a cover of trees or other natural endowments, care should be exercised to preserve as much of these as possible. Trees, grass, shrubbery, and flowers all help to produce an environment that is pleasant and soothing. In addition, they are valuable teaching aids.

Utilization of the Site

Planning a school building involves development of a master plan for utilization of the school site. This master plan, formally adopted and approved, locates the building on the site and considers the use to be made of every square foot of surface. Changes in the master plan should be made only for the most cogent reasons.

A building should be so located that it helps to protect the outdoor play areas from prevailing winds. The location should be designed to minimize dust, odors, and smoke blowing into classrooms and corridors. If unfortunate circumstances result in the site's being located near a busy thoroughfare or railroad, the buildings should be located on the side farthest from them.

Access to the building and grounds should be from the least traveled side. Consideration of pupil safety will result in access roads to the gymnasium, cafeteria, shops, and maintenance areas being so located that service and delivery trucks do not at any time cross pupil traffic lines. Many serious and sometimes fatal accidents have occurred because this precaution was not taken.

If bus transportation is provided for pupils, an off-street loading zone, preferably under shelter, is a necessity. The sheltered loading zone affords protection against rain or snow for the pupil who has to wait a considerable time for a parent or bus to pick him up.

Off-street parking should be provided for school employees and for everyday or casual school visitors.

At the secondary school level, parking space should be provided for pupils who drive to school. It is customary to require that cars be parked in a designated area and their removal regulated. Such a policy may prevent accidents and is always appreciated by police authorities.

When master planning a school site, many districts find it desirable to employ a landscape architect to work in conjunction with the building architect. Some districts require the building architect, as a part of his contract, to provide such services. A competent landscape architect does more than give advice on shrubbery or other plantings. He often is able to preserve and enhance the natural beauty of the site and to provide a more harmonious, soothing, refreshing atmosphere. This helps to produce happier and healthier children and youth.

PLANNING THE SCHOOL BUILDING

Building a school is the most important type of construction that any community can undertake. Whether it be a small or large school, whether it be a single school constructed in a village or one of many being built in a metropolis, its importance overshadows that of all other types of construction. In the school building will be housed hundreds and sometimes thousands of children and youth. The same building will house masses of young people for many decades. How important it is, then, to see that it is carefully and expertly planned.

With the advent of new school practices and new ideas concerning building construction, planning has become a team activity with many individuals and groups contributing viewpoints and information.

The School Board

The board of education, the duly appointed or elected body legally responsible for maintaining and operating schools, has responsibility for all school construction. The board may delegate certain responsibilities to the superintendent and other members of the school staff, and it may solicit advice from individuals with special competence in one field or another. It cannot, however, avoid its ultimate responsibility for approval of all plans and contracts.

The Superintendent of Schools

The school superintendent is the educational leader of the community and the executive officer of the board of education. It is his task to administer board policies, to acquaint the board with the results of educational research, and to provide them with information that will help them to reach decisions on educational matters. The superintendent and his deputies will discuss with the board various aspects of building planning, including the type, size, and location of the building and the specific features of its various parts.

Although the board of education and superintendent of schools play important roles in planning a school building, they have neither the time nor the knowledge to design a new building properly. These officials usually employ a school architect and authorize him to design a building to house a specified number of pupils.

The School Staff

Teachers and other members of the school staff help to plan modern school buildings. For them to be of greatest value in the planning process it is important that they make a projection of their present programs. They should participate in developing a philosophy for the entire school program and also one for each subject area.

There must be careful exploration of new procedures in school organization and new methods of teaching, to determine how these affect the facilities that will be needed. Multigraded classes may require different space arrangements than single-graded ones; team teaching requires different facilities than teaching conducted in self-contained classes; and the use of kinescopes, television, and language laboratories will need to be studied from the standpoint of the facilities needed, if they are to be used effectively.

Special attention should be given to matters relating to health, safety, and comfort. The sanitary facilities and equipment of new buildings must be approved by the state department of health. Planning procedures, however, should give attention to many health and safety factors not covered by state regulations. One or more persons with special knowledge of health should be on each building planning committee.

The Public

It is desirable to invite representatives of the public to work with the school staff in setting up the educational specifications for a new building. There are three distinct advantages to this. First, a better school plan is likely to evolve, one that reflects the viewpoints and wishes of both parents and teachers. Second, the citizens' group can give valuable assistance in interpreting innovations, school policies, and school problems to the general public. Third, these same citizens and their friends can constructively influence referendums that may be necessary for the approval of bond issues.

The Architect

The architect is the person who takes the suggestions of the school staff and others and translates them into specific drawings that reflect educational specifications. During the whole planning process it is helpful for the architect or a representative of the architect to participate in staff and committee meetings in which building plans are discussed. He can then communicate with them concerning requirements and limitations, whether these relate to materials, structure, or money.

The architect's job is, at best, time-consuming and exacting, especially in coordinating the work of many designers, engineers, and specialists in such areas as health, sanitation, and acoustics. He must make certain that children and youth will be housed in a building that will not collapse under extreme conditions caused by wind, water, snow, or earthquake and one that has appropriate barricades to the spread of fire. Every possible precaution must be taken to protect health and guard life.

The Advisory Committee

To coordinate the suggestions of many individuals and groups, an advisory committee or building committee to work with the superintendent and architect may be appointed. The committee should include representation from various fields of knowledge and interest, including teachers, principals, and parents; consultants from the state department of education and the local and state health departments; and representatives from the local medical society and from labor, business, and industry. Teachers and principals will tell what they hope to accomplish in the new building; parents will discuss what they want their children to learn and the skills and attitudes they hope their children will acquire; labor, business, and industry representatives will speak of their interests and concern in education; and representatives of the medical profession and health department will describe the effects of environmental factors on pupil health and present information concerning modern sanitation standards.

The committee will critically study, examine, tear apart, add to and subtract from a preliminary layout. The architect will then prepare a new layout, and the process will be repeated. This procedure may continue for many weeks.

Eventually, the building committee will agree on the educational specifications for the building and present its recommendations to the superintendent. After due consultation with other members of his staff, the superintendent will submit the proposed plan to the board of education.

In a large or rapidly growing community that is constantly building schools, the advisory building committee may be a continuing group that gives attention to all school construction. No building plan should be accepted as the best and final work on school facilities; no community can relax on the problem of planning and building its schools. No school building should be reproduced exactly, for each year new knowledge is gained that should be embodied in the next new school. Last year's plans are not good enough!

State Department of Education

Plans for new buildings usually must be approved by the state department of education, and the sanitary facilities and equipment by the state department of health. In some states, a number of state departments share responsibility for reviewing the plans, specifications, and financial proposals for new buildings. In only a few states is there authority for any state agency or department to provide inspections during construction or to make a final inspection of the building before final payment is made to the contractor.

Regardless of the state agency or agencies involved, the state usually establishes requirements for the size of the site, the size of rooms, the type of construction, the type and number of sanitary facilities, and other health and safety features. In some instances, agencies participate in an advisory capacity; in other instances, specific, rigid codes are enforced.

DEVELOPING SCHOOL PATTERNS

Over the years there have been marked changes in the characteristics of urban and rural schools—some brought about by changes in educational goals and practices, others by shifting population patterns, and still others by social forces affecting the entire community. The concept of educational parks, developed with the hope that they will improve the environment in which education takes place, has unique characteristics.

Urban Schools

Older elementary schools in urban areas were built upon rather small sites, usually in the inner part of the city. The small sites were a result of two factors. One was the high cost of land, and the other was that the type of program conceived at the time did not require a large site. Sections of the site not occupied by the building were usually dirt-surfaced or grassed, and occasionally a portion was hard-surfaced. School grounds often were fenced to prevent pupils from darting into the street and to keep pets off the school grounds.

There was little landscaping of the oldtime school site, so it presented a rather drab appearance. Psychologically, such schools were not very stimulating or attractive. Even so, in many cities rather austere elementary schools were in sharp contrast to the dilapidated areas which they served.

Too frequently, the gates to the school grounds were closed shortly after classes were dismissed and pupils had to play in the streets or in parks with a large number of "Keep Off the Grass" signs. It is no wonder that these schools contributed little to the development of aesthetic values.

High schools were constructed in cities on sites larger than those used for elementary schools, usually in newer sections of the city or close to its periphery. These new high schools were more attractive, better planned, and better landscaped than earlier schools. Psychologically, they were a great contrast to many of the rundown elementary schools from which they drew their students.

In many instances, students developed no pride in their new high school building and did not accept responsibility for maintaining it in good condition. As a result, the new school soon took on a shabby appearance. This was not true of all schools, however, because alert leadership on the part of some principals and teachers helped to develop a community pride and spirit which led to better care of the school by its occupants.

Lack of respect and responsibility for school property results in the expenditure of millions of dollars for school repairs each year. The cost of vandalism has caused New York City to plan schools with windows only on the sides facing an inner court.

In some cities, high-rise schools have been constructed because of the cost of land. Some of these buildings have play areas on the roofs, with fences surrounding them to eliminate the danger of falls.

With today's greater understanding of societal needs, it is possible to conduct community planning which develops desirable relationships between business, education, housing, and cultural institutions. Residents in redeveloped areas share responsibility for maintaining school and community facilities.

Rural Schools

The little white schoolhouse or little red schoolhouse, depending on the section of the country in which it was situated, was formerly the basic elementary school unit in rural America. The school building was frequently built on a corner lot ranging in size anywhere from a quarter of an acre to one acre. In the more populous states these little schools were seldom more than two miles apart; they frequently became the center of community activities.

High schools in rural areas were usually built on a small site somewhere near the center of a village. The building frequently occupied all of the useful area of the site.

For the most part, these rural high schools were copies of the high schools being constructed in urban areas. Little thought was given to the location of the building in terms of safety. Most students walked to school and parking needs were negligible. Many of these buildings borrowed the plain and austere appearance of their city cousins.

Very often high school buildings were really community schools and accommodated all grades from one through twelve. As the high school became overcrowded, the board of education often relegated the old plant to the use of elementary school children. They then constructed new high schools more remote from the center of the city with large gymnasiums and football fields. As a village grew, new elementary schools had to be constructed; but until then, many children had to suffer through the first six years of school in buildings which were not planned for their age level or for the type of educational program they needed. It would take a great stretch of the imagination to consider such buildings psychologically healthful.

As rural school districts consolidated, individual high school enrollments increased, creating the need for larger buildings. Even in the 1930's forward-looking school boards and school administrators selected sites of from 25 to 40 acres for these new consolidated schools. Such schools, at the edge of a village, could be connected with a public water supply and sewage system. Sometimes new school plants were built out in the country at the crossing of two main highways. Children were brought to school by bus. These schools usually provided a more effective type of education, hot lunches, better health services, and improved recreation. They became, in fact, real community centers. The educational environment became more attractive and healthful in these schools.

Only educators who have been through these consolidations and have conducted building programs can adequately realize the tremendous changes they have brought about in rural areas. However, as the new problems with regard to pupil transportation arose, it became necessary in all states to formulate rigid laws governing vehicular traffic and the operation of school buses.

The Modern School Building

Present-day school buildings show a marked improvement over those constructed in years past. Many have been designed by architects with special training and experience in school planning. These architects have carefully followed the educational specifications developed by the school staff in consultation with experts in various aspects of education. As a result, modern school buildings are more functional and more attractive than their predecessors.

Rather than a series of identical units, the modern school building contains areas of different sizes and shapes, each designed for the conduct of a specific educational activity. In addition to classrooms and office areas, there is a library, an auditorium, and a lunchroom. There are laboratories of various types, a health unit, and rooms for pupil personnel services; there may be specially equipped rooms for such areas of learning as industrial arts, music, art, business practices, and home economics.

Space should be reserved for nature study, various types of camping, and other recreational activities. If possible, a parklike atmosphere is desirable, with a wooded area, a lake, or a stream. The school buildings which are erected can be either high-rise or ranch type, depending on available space.

Among the advantages claimed for the educational park, several deserve special mention. It brings together all pupils in a community, thus alleviating de facto segregation in schools. A better and more varied educational program can be provided in a large unit than in a large number of small units. Furthermore, administrative efficiency is facilitated. Only after a period of experimentation will the effectiveness of educational parks be determined.

FACILITIES FOR HEALTH SERVICES AND HEALTH EDUCATION

Regardless of the size of a schoolhouse or where it is located, attention needs to be given to providing suitable space for conducting the school health program. School health services require that several rooms be available in which to carry on the variety of activities that comprise that program. Health education at the junior and senior high school level can be of greatest value and effectiveness if a special classroom, fitted with appropriate teaching aids, is provided.

Space for Health Services

The various activities that comprise school health services determine the facilities that are needed. One room may be used as a reception and waiting room and for first aid supplies, health record files, and platform scales, but ideally two rooms should be provided so that the waiting room can be separate from the room used as an office and for records. A small, quiet room is needed for conferences between the physician or nurse and a pupil or parent. This room may also be used for medical examinations. Another small room should be constructed with acoustical treatment so that it may be used for individual audiometer tests.

In addition to the preceding, rooms where pupils may rest should be provided. In elementary schools, a rest room can be used by both boys and girls, but separate rooms are needed in junior and senior high schools. The number of cots needed depends on the number of pupils enrolled. In secondary schools more cots will be needed for girls than for boys, because of the frequency of menstrual difficulties.

Decoration and equipment are important factors in producing a school health unit that is attractive and functional. Pastel-colored walls with a different color or shade for each room help to create a warm, friendly environment. A minimum of 50 footcandles of light should be provided in all rooms except the rest rooms, where 10 footcandles will be adequate. Sufficient electric outlets should be available to take care of the special equipment that health personnel may require. A single occupancy toilet should be provided, as well as hot and cold running water. Bulletin boards located in the waiting room make possible the display of charts, pictures, cartoons, posters, and other health education material.

Location of the Health Unit

The school health unit should be located close to the administrative offices for purposes of supervision, access to files and a telephone, and nearness to the main entrance of the school. A carefully planned unit will permit easy access by both pupils and parents. Outside windows are desirable as a source of natural lighting and ventilation.

In years past, high school health units were frequently, but undesirably, placed near the gymnasium. Noise from the gymnasium made it almost impossible to carry on conferences with pupils, to perform medical examinations, or to conduct screening tests. Furthermore, such units were often accessible to only one sex. Centrally locating the unit, adjoining the school's administrative offices, has proved to be a much better arrangement.

Space for Health Classes

Increased emphasis on the need for expanded and improved health teaching in junior and senior high schools has brought to the fore the need for appropriate space for this activity. The old practice of teaching health to large groups of pupils gathered in a gymnasium or auditorium was ineffective and unsatisfactory to pupils and teacher. It is now felt that health classes should be no larger than classes in other subjects in the curriculum and that they should be taught in well-equipped classrooms.

Wherever possible, one or more classrooms should be designated as "health classrooms" and so equipped as to facilitate functional health education. It should be possible to arrange and display health exhibits made by pupils, to hang posters and charts, and to show kinescopes. Models of the human body and of the systems and organs of the body should be part of the equipment of a health classroom. Running water and gas and electric connections in a table suitable for scientific demonstrations should be available. A collection of health text and reference books should be arranged in one part of the room. Providing an appropriate, attractive, and well-equipped teaching area is one way to improve health education.

SCHOOLS FOR TOMORROW

Tremendous changes are taking place in our social, economic, and political structures, and also in school programs. Such innovations as team teaching, modular or flexible scheduling, programed learning, educational television, and computerized programs are being tried out in various schools throughout the country. And other innovations will undoubtedly be introduced in the years ahead.

The type of building needed for tomorrow's programs of education cannot be predicted with any degree of accuracy. However, schools being built now must be expandable to care for anticipated increased enrollments and adaptable to adjust to changing needs. The use of modular construction units is one way that these goals are being attained.

Undoubtedly, much time, thought, and skill will be devoted to planning schools for tomorrow's children and youth, particularly when greater attention is given to the effect of environmental factors on pupil growth, health, and learning.

FOR FURTHER READING

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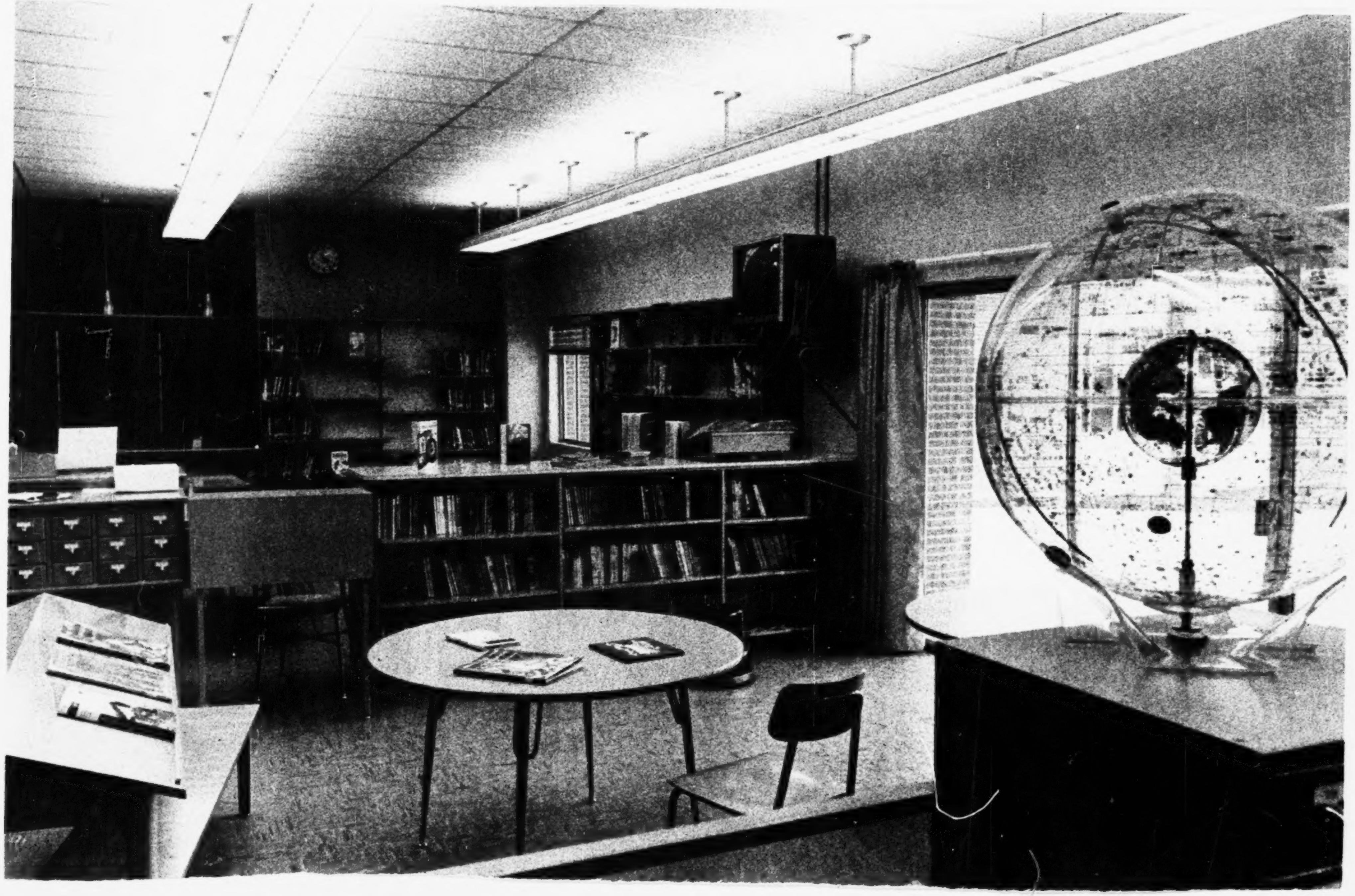


Chapter 9

Lighting and Acoustics

Since most learning results from sensations received through the eyes and ears, it is important that schools give attention to lighting and acoustics. Proper lighting increases pupils' ability to see clearly and easily; good acoustics minimize distractions and promote good hearing.

Although attention to lighting and acoustics is desirable as a means of facilitating learning, these environmental conditions also directly and indirectly affect health. Inadequate light can contribute to falls on stairways, accidents in the gymnasium, and careless use and inadequate cleaning of toilets and washrooms. Less obvious effects of inadequate lighting and poor acoustics will be described in later sections of this chapter.

Schools have been concerned with lighting for many years, but the way to secure the proper kind and amount of light is still a subject of much discussion and some misunderstanding. It is a complicated matter, involving attention to many factors. Both natural lighting and artificial illumination must be considered.

In comparison to lighting, acoustics is a relatively new area of interest. Only in recent years has concern been shown for the effect of noise on health and on learning and for preventing undesirable noise levels in different areas of the school building. The control of noise through acoustical treatment is a twofold undertaking; it includes preventing outside noises from entering the school building and minimizing the transfer of noises generated in one part of the school to other areas.

SCHOOL LIGHTING

Under conditions of inadequate or improper illumination, a person has to strain to see. There is a tendency to bring objects to be seen closer to the eyes in order to obtain a larger image on the retina. This is an act which requires contraction of the muscles which move the eyeball and also contraction of the tiny muscles inside the eye that control the size of the pupil and the shape of the lens. Such action produces eye fatigue and creates difficulties for rapid reading and ease of comprehension. Ocular fatigue also may result from glare and from the attempt to adjust to marked contrasts in brightness or color between the objects on which the eyes are focused and the surroundings.

Although poor illumination may produce eye fatigue, it will not cause organic damage to the eye or permanent functional impairment of vision.

However, when a pupil or teacher continues to work under improper lighting conditions there may be a functional effect beyond that of eye fatigue. As a result of continued, increased expenditure of nervous energy in an effort to concentrate on the visual task, there may be headaches, dizziness, loss of appetite, nausea, other stomach symptoms, and nervousness or irritability.

The Visual Environment

The field of vision of a person with two normal eyes extends about 140° vertically (65° upward and 75° down) and about 210° horizontally (a little more than 100° to each side). Even though the eyes focus on a book on the desk or on writing on the chalkboard, everything within the field of vision acts upon the sensitive cells of the retina. The aim of school lighting is to create a total visual environment in which pupils and teachers can see comfortably and efficiently and without unnecessary distraction. Achievement of such a goal involves more than providing a given window area for a classroom of a given size and determining the number of lighting fixtures required to supply a specified illumination level. It involves *quality*, as well as *quantity*. The finishes of room surfaces and furnishings and the relationships of areas to each other and to the light sources must be carefully considered in view of the activities to be carried on in the room.

In addition, from the aesthetic standpoint the lighting should help to create a cheerful, pleasant environment, and the design of the installation should be appropriate to the architectural and decorative style of the building. Best results will be achieved when the resources of architects, engineers, and educational authorities are coordinated.

Illumination Levels

Adequate illumination for the task is the first requirement of all lighting for serious eye work. School tasks vary tremendously in visual difficulty, depending upon the size of the detail to be seen (large 12-point type or small 6-point type), the contrast between the detail and its immediate background (good black ink on white paper or faint duplicating on grayish paper), and the time available for seeing (a stationary or moving object or material that must be assimilated at various rates of speed). Measurements have been made in laboratory situations simulating many typical school situations, and the quantity of light (illumination) necessary for satisfactory visibility has been determined. Table 1 shows current mini-

TABLE 1 | RECOMMENDED LIGHTING LEVELS FOR SCHOOLS

Situation	Minimum Footcandles
Tasks	
Reading printed material	30
Reading pencil material	70
Spirit-duplicated material	
Good	30
Poor	100
Drafting, benchwork	100[a]
Lip reading, chalkboards, sewing	150[a]
Classrooms	
Art rooms	70
Auditoriums (used for assembly only)	15
Drafting rooms	100[a]
Home economics rooms	
Sewing	150[a]
Cooking	50
Ironing	50
Sink activities	70
Note-taking areas	70
Laboratories	100
Lecture rooms	
Audience area	70
Demonstration area	150[a]
Music rooms	
Simple scores	30
Advanced scores	70[a]
Shops	100[a]
Sight-saving rooms	150[a]
Study halls, libraries, and reading rooms	70
Typing	70
Corridors and stairways	20
Toilets and washrooms	30

Source:
American Institute of Architects, Illuminating Engineering Society, National Council on Schoolhouse Construction. *American Standard Guide for School Lighting*. New York: Illuminating Engineering Society, 1962.

[a] To be obtained by combination of general lighting and special supplementary lighting.

mum recommendations based on these tests; optimum illumination levels could well be considerably higher. Illumination is measured in *footcandles*, one footcandle being the amount of light on a surface at a distance of one foot from a standard candle.

Electric lighting installations should be designed to provide these levels *after* a reasonable amount of depreciation due to aging of the lamps and collection of dirt on fixtures and room surfaces (ceiling and upper walls). Initial footcandles should exceed the recommended minimum by 20 to 33 percent.

These footcandle levels are to be supplied uniformly on the plane where the visual task is located, and it must be borne in mind that this is not necessarily fixed. In ordinary classrooms the desk and the chalkboard are probably the major areas involved, but charts are hung on the wall, and work may even be done on the floor. Special-purpose rooms, such as laboratories and music, art, and home economics rooms, require consideration of a large number of task areas and a wide variety of seeing problems. The same requirements exist in a gymnasium which may be used at times for dances, concerts, lectures, or community meetings. Variations in illumination may be achieved by using a combination of circuits which can be used separately or together.

Any lighting system should be planned to allow for flexibility in room use, the variety of tasks involved, and for pupils moving about and working individually or in groups. Since educational methods are constantly changing, thought should also be given to possible future requirements.

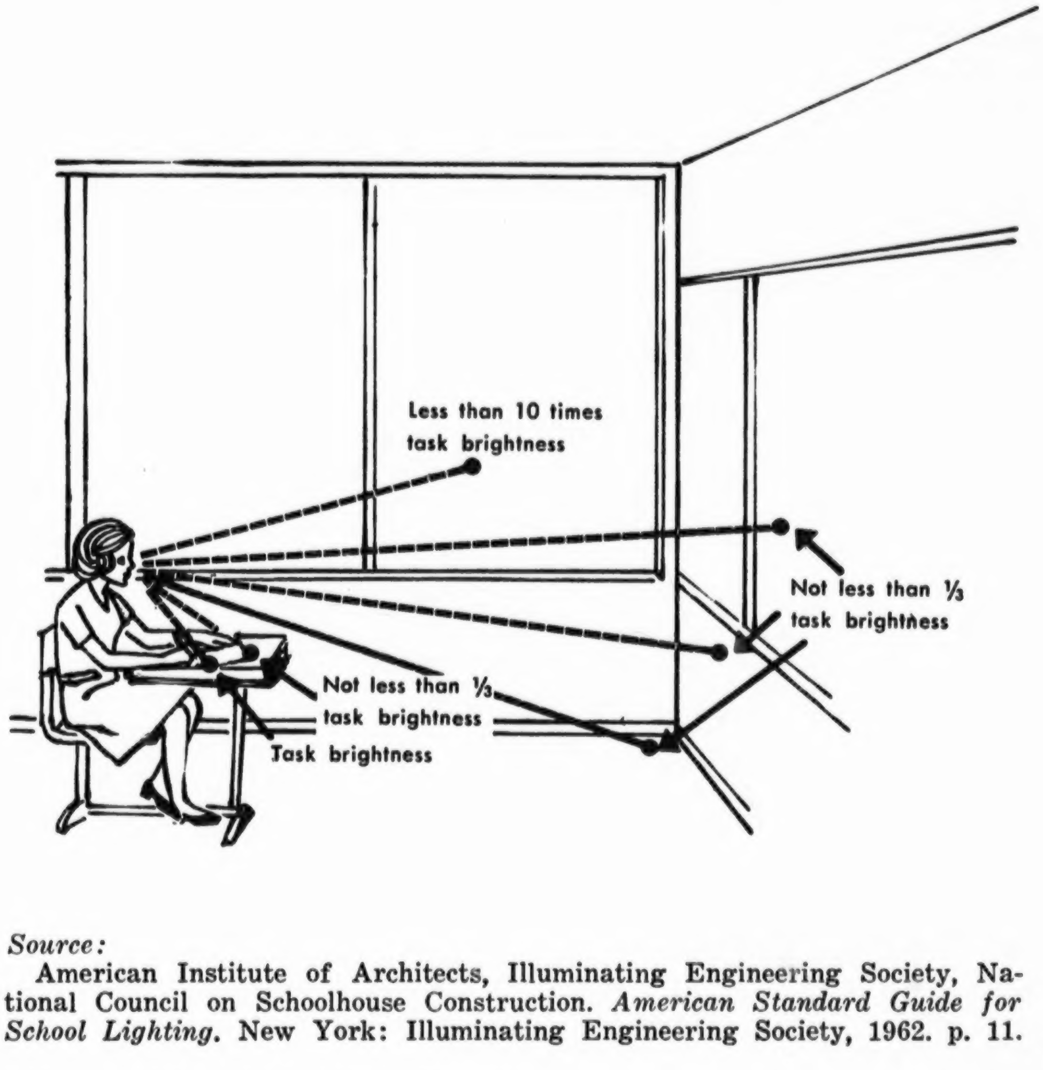
Brightness Relationships

No criterion of quality in lighting design is more important than the interrelationships of all the brightnesses in the visual field. When a pupil reads a book at his desk, his eyes become adapted to a certain brightness level. When he shifts his gaze momentarily or is directed to turn his attention elsewhere, his eyes encounter the brightness of the floor, the chalkboard, the wall, the window, perhaps even the lighting fixture. If there is much difference between the two levels, visibility is poor for the brief interval that it takes for the eyes to become adjusted to the new level. Also, the eyes are required to do more work than is necessary, and for large brightness differences there may even be momentary discomfort. The brightness of the area immediately surrounding the visual task—in this case the desk top—has been found to be another factor having a significant effect on ease of seeing. The recommendations of the current *American Standard Guide for School Lighting* are summarized in the drawing shown in Figure I.

Glare

Glare may be defined as the effect of brightness or brightness differences sufficiently high to cause distraction, discomfort, or reduction in visibility. There are two kinds of glare: direct and reflected. Direct glare results from areas of high brightness in the field of

FIGURE I | **SURFACE BRIGHTNESS**


Less than 10 times task brightness
Not less than ⅓ task brightness
Not less than ⅓ task brightness
Task brightness

Source:
American Institute of Architects, Illuminating Engineering Society, National Council on Schoolhouse Construction. *American Standard Guide for School Lighting.* New York: Illuminating Engineering Society, 1962. p. 11.

view—in the schoolroom, usually windows or lighting fixtures. The smaller the area of such a source, the farther it is above the line of sight, and the lighter the surroundings against which it is seen, the less the glaring effect. Reflected glare is the result of a bright source—sunlight or a lighting fixture—reflected in a shiny surface. A highly polished desk or floor, the glass cover of a picture or cabinet door, or any glossy object may be a source of annoying or uncomfortable reflected glare if its position is such that it can reflect light from a high-brightness source toward the eye. The use of matte, or nonglossy paints, varnishes, and finishes on all surfaces is obviously important in the control of reflected glare.

Perhaps the most common form of reflected glare—and the most insidious because not always recognized—is reflection from glossy or semiglossy paper. Reflections of windows or lighting fixtures on the paper surface can veil the print and make it harder to read. Overhead fixtures directly in front of the pupil are most likely to contribute to this type of glare, which is difficult to eliminate altogether but may be greatly reduced. The *American Standard Guide for School Lighting* gives fixture brightness limitations and other measures that will help in avoiding both direct and reflected glare.

Reflectances

Dark colors absorb most of the light falling on them, whereas light colors reflect much of it. Light, matte finishes on all room surfaces and furnishings, in addition to being more cheerful and pleasant than dark ones, are almost essential in achieving good lighting for schools. Changing wall, ceiling, and floor colors from dark to light can easily double the illumination, with no change in the lighting equipment. Light walls and ceiling decrease shadows by reflecting light to the work plane from a large area. The brightness-ratio limitations detailed in Figure I cannot be met without light-finished desk tops as the immediate surroundings for the visual task and without reasonably light walls and floor.

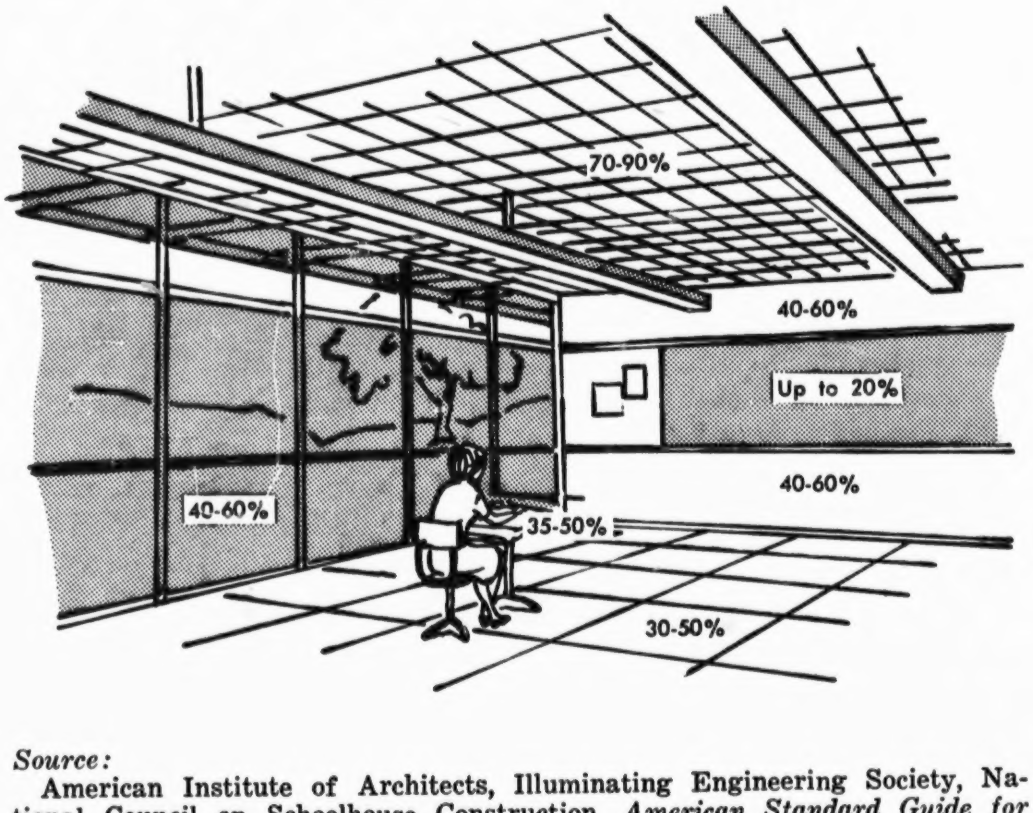
Light ceilings reduce direct glare by lowering the brightness difference between lighting fixtures and the background against which they are seen. Window walls and casings are often painted an especially light color to reduce the difference between the wall and the natural light entering the windows. Figure II shows recommended reflectances (percentage of light reflected) for classroom surfaces and furnishings. Paint manufacturers usually supply information on the reflectances of their products.

Electric Illumination

Electric lighting must supply all the illumination necessary for evening use of schools and on dark days. In most rooms electric light is needed to supplement daylight for at least part of the average day, especially for the seats farthest from the windows. Rows of fixtures are sometimes provided with individual switches for flexibility in this respect. Occasional use of a light meter will enable school personnel to become familiar with fluctuations in illumination during the day and in various weather and seasonal conditions. If the school lacks a light meter for teachers' use, one can usually be borrowed from the local health department or power company.

Either incandescent or fluorescent equipment, if properly installed and maintained, can provide illumination of adequate quantity and good quality. The initial cost of a fluorescent system is

FIGURE II RECOMMENDED REFLECTANCES FOR SURFACES AND FURNISHINGS IN THE CLASSROOM



Source:
American Institute of Architects, Illuminating Engineering Society, National Council on Schoolhouse Construction. *American Standard Guide for School Lighting.* New York: Illuminating Engineering Society, 1962. p. 12.

higher, but because the lamps produce much more light and less heat per watt of electricity consumed, a comparison of two systems designed for the same footcandle level may show that the overall cost (fixtures, lamps, wiring, installation, maintenance, and power) over a period of years is lower for the fluorescent than for the incandescent.

In remodeling old buildings a change from incandescent to fluorescent fixtures may save the expense of rewiring the building, since much higher footcandle levels can be obtained without requiring more power. Fluorescent systems are selected for the great majority of new school installations today. Although much lower in brightness than the incandescent lamp, fluorescent lamps should never be used unshielded; in other words, a bare lamp should never be visible from any normal position in the room.

Some lighting fixtures, both incandescent and fluorescent, direct all their light downward, some direct all their light upward, and there is every degree of intermediate distribution. The larger the source contributing light to the visual task, either direct from the fixture or by reflection from room surfaces, the greater the degree of diffusion of the illumination—i.e., the light comes from many directions and casts only soft shadows. For this reason fixtures that send at least part of their light to the ceiling—and white or very lightly tinted ceilings are required for high reflectance—are usually preferred in schoolrooms. When the whole ceiling becomes a light source, as it does with an indirect system or with a luminous or louvered ceiling, and the upper walls are very light, the maximum of diffusion and the minimum of shadows are attained.

No one type of distribution can be recommended exclusively for all applications. Each has characteristics that may meet requirements for some situations. For reading, writing, and most general classroom tasks a high degree of diffusion is desirable. However, there are three-dimensional tasks where some modeling shadows are essential, and highly diffuse light is not satisfactory. Some directional component in the light is an advantage in the often very difficult seeing problems involved in sewing and in other circumstances, each of which must be evaluated individually. High footcandle levels for special applications are usually attained by adding some kind of supplementary lighting to the general lighting system.

Natural Lighting

Most schoolrooms utilize both electric and daylight lighting. In one story buildings daylight can be admitted from overhead, either by roof apertures or by clerestory windows, or by means of a large cavity above a room-size translucent or louvered panel, giving the effect of a luminous ceiling. More commonly the sources of daylight are vertical windows in a side wall, a situation which makes it extremely difficult to distribute the light uniformly over the width of the room. Since the upper part of the window is more effective in lighting the inner side of the room, windows should extend to as near the ceiling as possible. Clerestory windows in conjunction with side-wall windows will help to increase illumination on the inner side of the room.

A window can be regarded as serving two functions: admitting daylight and permitting a view through it; and the two are sometimes separated. There may be a vision strip of clear glass at seated eye level and direction-controlling glass or plastic material above, redirecting light toward the ceiling. The brightness and heat-transmitting properties of prismatic glass blocks or other similar materials in such an application must be studied. It is possible under certain circumstances for them to have a higher brightness than the exterior as seem through clear glass. Low-transmission neutral glass used for the lower portion of the windows will reduce the brightness of the view to comfortable levels.

Direct sunlight on windows requires constant monitoring and adjustment of shades or other control devices to prevent uncomfortable conditions, and it is preferable to design the building to avoid this necessity. This can be accomplished by orientation of the building, by overhanging roofs or louvers, and sometimes by trees and neighboring buildings. In Figure II on page 167 an external shield excludes sunlight; the lower windows are of low-transmittance glass, but the upper part is clear glass for the transmission of "ground light," light reflected from lawns and walks to the shield, and from the shield into the room.

Draperies, if used, should be hung at the sides of the windows beyond the window frames in order not to shut out daylight. Care should be taken not to block out light by extensive decorations on window glass or an overabundance of plants on window sills. If audiovisual aids are to be used, provision must of course be made for excluding all daylight.

Rooms without windows have been built in some schools. The absence of windows prevents interruption of classroom procedures by outside influences and eliminates the cost of replacing window glass broken by vandalism. Also, heat loss is reduced. Windowless rooms must, of course, be ventilated by mechanical means. The psychological effect of windowless rooms on teachers and pupils needs careful study.

What the Classroom Teacher Can Do

Schoolwork requires constant use of the eyes, much of the time at fairly close, exacting tasks, for a number of hours each day. If seeing is complicated by inadequate illumination, by shadows or annoying glare, by constant shifts from one brightness level to a markedly different one, or by work materials of poor visibility, the inevitable result is the unnecessary expenditure of nervous energy. Continuation of such conditions for long periods of time may lead to fatigue and tension not consciously attributed to the difficulties of seeing.

There is much that the teacher can do to help maintain a classroom environment in which pupils can see with minimum effort and maximum comfort. Some teachers designate an illumination committee to check various aspects of the visual environment three or four times a day, rotating the duty each week.

In regard to pupils, the teacher can—

1. Permit pupils to arrange or change seats whenever this will provide better conditions for seeing.
2. Arrange for pupils with eye difficulties to sit in places considered best from the standpoint of their specific defects.
3. Arrange seats and desks so that no pupil will face a window or work in his own shadow.
4. Try to alternate periods of close eye work with activities that are visually less demanding.

In regard to materials and equipment, the teacher can—

1. Insist that the minimum type-size of textbooks be 10-point type. Young children should have books with larger type.
2. Make sure that all duplicated materials are of good quality.
3. Eliminate books, charts, and maps that have become so soiled that the contrast between print and paper is poor.
4. Use only matte-finished papers of high reflectance and a good degree of opacity for both workpaper and printed material.
5. Encourage the use of nonglossy inks.
6. Write on chalkboard in large clear letters, in the line of pupils' vision.

7. Keep chalkboard clean; white chalk of good quality is preferable.
8. Stand or sit in positions which direct pupils' view away from windows.
9. Avoid hanging posters and charts between windows.
10. Make sure that electric lights are turned on whenever the illumination falls below standard in any part of the room. (Some schools are equipped with photoelectric cells that do this automatically.)
11. Report failed lamps and see that they are replaced immediately. See that lighting equipment is cleaned periodically and thoroughly.

Through these procedures, the classroom teacher helps to provide a healthful visual environment, one that increases the attractiveness of the classroom and enables pupils to see comfortably and clearly.

ACOUSTICS IN THE SCHOOL

When one thinks of a school, the pictures which usually come to mind include a teacher talking with his pupils, pupils talking or working together, or pupils reading, writing, or occupied with a laboratory experiment. Hearing is an important factor in these common school activities. They are facilitated by good acoustics.

Schools contain many sources of noise: pupils and teachers, typewriters, motion picture projectors, mechanical ventilators, shop machines, activity in gymnasiums, activity in music rooms, and perhaps dishwashing machines. Additional sources of noise originate in the immediate vicinity of the school from automobiles and trucks on the road or planes roaring overhead. Activities in factories and nearby construction work may add their particular types of disturbing and distressing noise. The problem of the school is to provide insulation against outside noises and to confine noises inside the building to particular areas.

The wide variation of activities within a school makes it impossible to present one acoustical standard. Rather, each activity creates a certain amount of sound, has certain requirements for distribution of that sound, and certain requirements for limitation of interference from outside noise. Thus, there is need for separate determination of the acoustical needs of different parts of the building.

Often the importance of acoustics is realized only when problems concerning it arise. In acoustics, however, as in many other areas, correction is more difficult and less effective than prevention. Although it is not always possible to prevent the creation of sound, it is often both possible and practical to prevent it from becoming a disturbing noise.

Effect of Noise on Pupils and Teachers

Noise is unwanted sound. *Sound* in this definition indicates a phenomenon affecting the sense organ of hearing while *unwanted* refers to psychological interference with a person's ability to function effectively. These effects have been studied in many situations, from which has come an appreciation of the complexity of the results of noise and the interrelationships which exist between noise and other stimuli.

Sound consists of vibrations which behave like waves in a solid, liquid, or gaseous medium. The number of waves per second determines the frequency, or whether the sound has a high or low tone. The pressure with which the waves move determines the loudness of a sound and is expressed in decibels. Zero decibels is the lowest threshold of normal human hearing; the upper limit of loudness is approximately 130 decibels.

Sound itself, except at abnormally high levels, has been found not to have any direct, detrimental physical effect on man. Hearing loss attributed to noise may occur in an uncontrolled industrial setting, but is entirely outside the scope of school concern.

The effect of noise on mental and emotional health is of importance in every school situation. Teachers or pupils may have certain feelings or attitudes toward specific noises, based on their past experiences. Noise may be annoying or distracting; it may cause fear or anxiety; it may lead to irritation, frustration, or fatigue.

No set characteristics make certain noises more annoying than others. Instead, the degree of annoyance is related to the situation into which noise intrudes itself and the repetitiveness with which it occurs. Continuous sweet music may be more distracting than the occasional clanking of garbage cans. A range of subjective factors influences the effect of noise on mental health. The length of time a sound persists and the periods of quietness between noises always influence the effect it produces. A statement of the average sound level does not indicate the disturbing effect of fluctuations.

In a school, noise influences communication between pupils and teacher. Talking loudly, in order to overcome the handicap of noise, may produce tension and fatigue. It is acoustically advantageous that the speaker be located between the outside noise source and his listeners, since in that situation the speaker will adjust the loudness of his voice to overcome interference and, at the same time, the listeners will be further away from the outside disturbance. For the same reasons, a pupil with a hearing handicap should be so placed that, to the greatest degree possible, his better ear is on the side toward the source of speech he wants to hear.

Acoustics and Building Planning

When plans are being made for a new school building, thought should be given to the need for good acoustics. The acoustical design of a school building should include attention to the site and the proper location of buildings on the site. Other considerations include landscaping, location of playgrounds, arrangement of rooms within the building, and requirements for sound insulation. Various parts of the bulding will need particular consideration because of special needs for a quiet environment and good acoustics.

Architects should be informed of the acoustical requirements of a school and should become acquainted with the noise factors in areas being considered for school buildings. Proximity to the homes of pupils and to transportation facilities is important in selecting school sites. However, a site which is favorable from these points of view may be near a traffic intersection which means that a building erected thereon will either be unsatisfactory because of noise or that considerable expense will be required to insulate it from noise. A quiet site, though more costly to acquire, may in the long run be more economical and more useful. A sound-level survey should be made before deciding on the site for a proposed school.

The noise level at school sites should be below 70 decibels. To assure this condition, it is necessary to select sites that are away from trucking routes, railroads, noisy factories, trolley lines, main traffic arteries, and airplane routes. When there is no sound barrier between the noise source and the school, it is recommended that local ordinances prohibit horn honking within 400 feet of the school and that main traffic roads be at least 200 feet from the school. Since there is never a barrier between the school and passing airplanes, the school should be so located that no plane will ordinarily fly less than 4,000 feet from it.

The highest level of noise within a building which neither disturbs occupants nor impairs its acoustics is called the "acceptable noise level." This level depends to a large extent on the character of the noise and the activity in which a person is engaged.

Several authorities have proposed acceptable noise levels for different parts of a school building in relation to the pitch (vibration frequency) of a sound.[2] For classrooms, low-pitched noises should not exceed 55 decibels, and high-pitched ones not exceed 18 decibels. The corresponding levels for a gymnasium would be 75 and 44 decibels.

In striving to stay within acceptable noise levels, the selection of an appropriate site must be coupled with attention to sound barriers and sound isolation, as well as to insulation of walls, partitions, and ventilation ducts.

Buildings, Playgrounds, and Planting

The subdivision of a building site and the arrangement of buildings thereon should be made with due consideration to acoustical factors. Quietness in certain areas of a building may be achieved by locating them away from sources of noise, as well as by erecting barriers between the noise source and the desired quiet area.

Buildings removed a few hundred feet from busy streets or shielded by other buildings or dense plantings of shrubs or trees will be reasonably free from traffic noise. Earthen embankments or masonry garden walls act as barriers for high frequency sound components and reduce the sound level by about five decibels. If, in addition, the surface of the barrier is made absorptive through the use of grassy turf, dense vines, or peat moss, the reduction may be as much as from 8 to 18 decibels. Hedges and trees act as barriers and reflectors of sound, the effectiveness depending upon height, thickness, and density of the growth. A cypress hedge two feet thick, for example, has a sound obstructing value of about four decibels.

The interrelationship of various parts of the school building influences acoustics. When the school is so arranged that its more noisy activities take place near the sources of outside noise, there is an economy of insulation for the more quiet areas. Playgrounds between the building and the street act as distance barriers and cause noise from the street and playground to merge, forming one source against which insulation is needed instead of two. For the same reason, the sides of the building facing streets, playgrounds, and other sources of noise should be planned to house those activities which can easily tolerate noise; and the sides that face a quiet environment used for those activities which require quietness.

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[2] Murphy, D. C. "Noise Specifications." *Annals of Occupational Hygiene* 6: 15-23; 1963.

International Standards Organization. *Report of Technical Committee 43.* Washington, D.C.: the Organization, 1961.

Much disturbing noise enters rooms through open windows. Consequently, it is important that rooms which require quiet not have windows facing such potential sources of noise as nearby playgrounds and streets. Courts surrounded by rooms with windows opening onto them may also become sources of noise. When there are open windows, planting is effective as a barrier for both incoming and outgoing noise, but it should not be allowed to shut out needed light. Poorly fitting doors, like open windows, are pathways for noise to enter a room. Treating adjoining corridors with absorptive material can reduce disturbing effects from this cause.

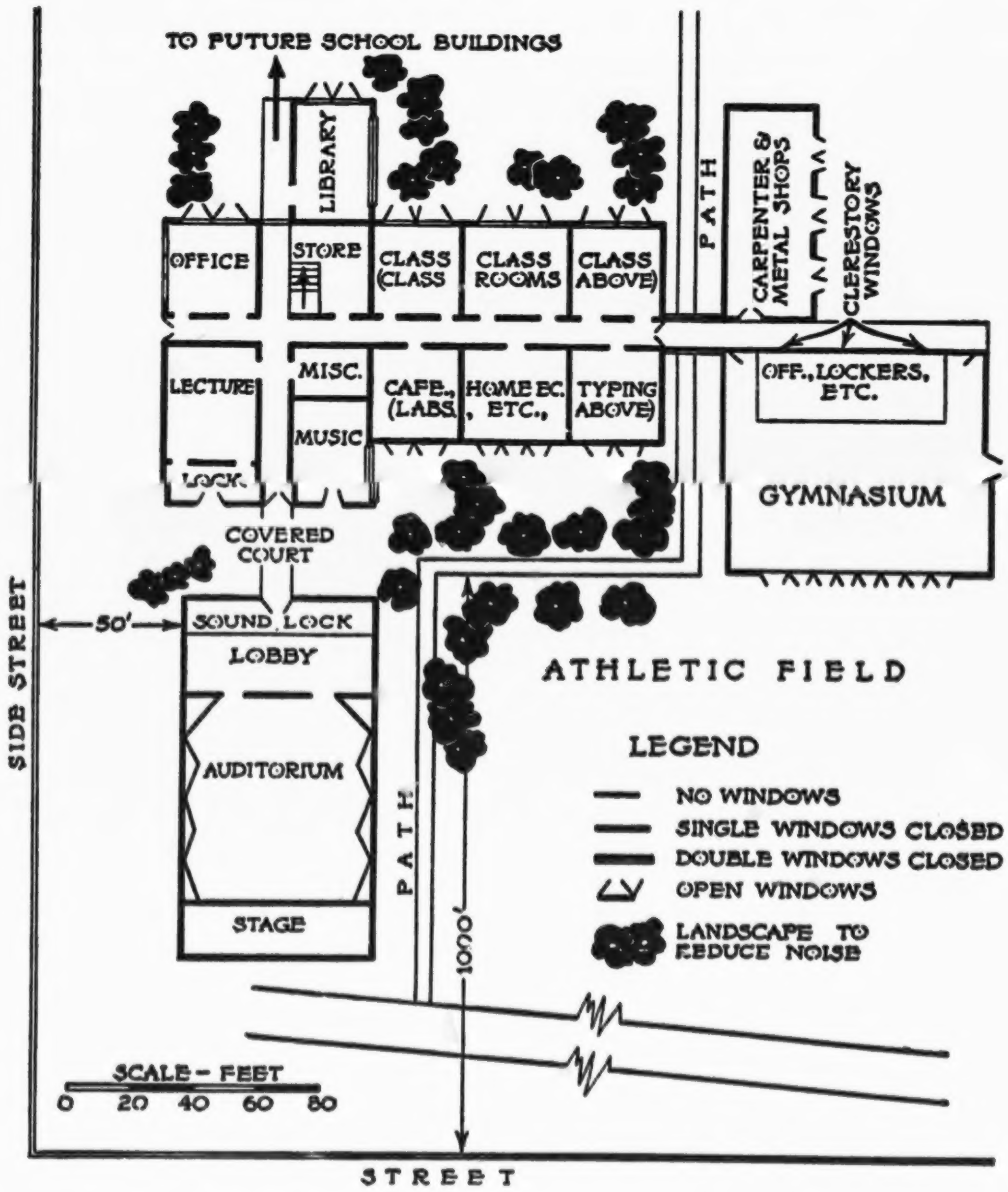
Ventilating or air conditioning systems may provide channels for the transmission of noise from room to room unless this is specifically guarded against. The steady hum of poor ventilating equipment, though it sometimes escapes attention because it is continuous, can be as demoralizing as sudden, intermittent noises from other sources. The design of the ventilating system should be such that distribution and return ducts do not pass through several rooms but instead feed into a central duct. The selection of suitable grilles, motors, and fans; the streamlining of the air transmission system to avoid turbulence; and the application of absorptive materials within the duct system all serve to control the transfer of noise.

Figure III on page 176 illustrates a practical application of acoustical principles. The classroom section and the auditorium are set back at least 50 feet from the street. The arrangement of the buildings and rooms is such as to separate those that require quiet from centers of noisy activity. Double-glazed windows are indicated where sound insulation requirements are most stringent. The arrangement of the windows to provide the longest possible path for air-borne noise between adjacent rooms illustrates good practice. So does the staggering of doorways along the corridors and the planting of dense foliage and shrubbery.

Classroom Acoustics

The size and shape of classrooms influence their acoustical qualities. Long, narrow rooms are less satisfactory than those more nearly square. Since the acceptable noise level for classrooms is 40 decibels or less, and that for school sites about 70 decibels, wall and ceiling construction may have to absorb 30 decibels or more of sound. Architects are familiar with the absorptive power of various building materials and should see that these are used to the best advantage. It must be remembered, however, that sound insulation

FIGURE III **ACOUSTICAL ASPECTS OF SCHOOL BUILDINGS AND GROUNDS**


TO FUTURE SCHOOL BUILDINGS
LIBRARY
OFFICE
STORE
CLASS (CLASS
CLASS ROOMS
CLASS ABOVE)
LECTURE
MISC.
MUSIC
CAFE., (LABS.
HOME EC., ETC.,
TYPING ABOVE)
LOCK.
PATH
CARPENTER & METAL SHOPS
CLERESTORY WINDOWS
OFF., LOCKERS, ETC.
GYMNASIUM
COVERED COURT
SIDE STREET
50'
SOUND LOCK
LOBBY
AUDITORIUM
STAGE
PATH
1000'
ATHLETIC FIELD
LEGEND
NO WINDOWS
SINGLE WINDOWS CLOSED
DOUBLE WINDOWS CLOSED
OPEN WINDOWS
LANDSCAPE TO REDUCE NOISE
SCALE - FEET
0 20 40 60 80
STREET

through treatment of walls and ceilings will be from 25 to 40 percent less effective when open windows and doors provide unobstructed sound pathways.

The most important single factor in classroom acoustics is control of the reverberation of sounds, or echoing. In this process, sounds are prolonged through successive reflections from walls and ceilings after the original source has stopped producing the sound. The higher the reverberation time, the more it interferes with subsequent sounds. The optimum reverberation time in a small room is between 0.75 and 1.0 seconds. Reverberation is influenced by the amount and type of absorptive and reflective surfaces in the room, including all objects and persons, absorptive surfaces decreasing it, and reflective surfaces increasing it.

If necessary, absorptive material can be applied to walls and ceilings to reduce reverberation time. Part of the room surfaces may be treated with highly absorbent material or all surfaces with less highly absorbent material. Floors may be carpeted. The choice of material requires consideration of cost, fire resistance, and appearance.

The Auditorium

In auditoriums, or in large classrooms, particular care must be taken to make possible the hearing of speech in all parts of the area. The ratio of length to width should be about 1.2 to 1, and the walls and ceilings should be designed to give beneficial reflection of sound. The volume of the room should be kept as small as feasible. Large rooms will require facilities for voice amplification.

The audience in an auditorium constitutes a highly absorptive surface which reflects sounds only slightly. It is important, therefore, that there be a maximum direct flow of sound from the speaker to listeners. A gradual elevation of seats promotes good vision and also facilitates a good flow of sound.

Music Rooms

The acoustical needs of rooms used for band, orchestra, or choral activities are similar to those which apply to auditoriums. Absorbent material near the sound source should be avoided in order that the performers themselves may easily hear each other. Wooden floors and paneling near the platform are desirable for reflecting sound and for preventing transmission of vibrations throughout the building.

Sound insulation of music rooms is needed to avoid disturbing other players in the room, as well as to prevent the music from annoying pupils and teachers in nearby rooms.

The physical arrangement of a music room influences its usefulness as such and its effect on other school activities. A separate wing housing all musical activities decreases the need for elaborate insulation. It is desirable to avoid parallel surfaces in walls, ceilings, and floors, in order to benefit the diffusion of sounds. Open bookshelves at one end of the room increase absorption. Acoustical treatment of the corridors adjoining music rooms produces an effective sound block.

The Gymnasium

Ideally, the gymnasium and the adjacent locker rooms should be located in a separate wing at a distance from classrooms. Noise resulting from reverberation needs to be controlled. This can be accomplished by irregular distribution of sound-absorbing material, by irregularities in the ceilings and walls (such as protruding beams and trusses), and by distribution of windows and doors to avoid smooth, reflective parallel surfaces. Acoustical material must be sturdy and durable, such as fiberboard applied to a hard backing. Most or all of the ceiling will require treatment with absorptive material.

The acoustical needs of swimming pools are similar to those of gymnasiums.

The Cafeteria

Noise and reverberation control are the acoustical problems of cafeterias. These can be solved satisfactorily through utilization of acoustical tile in the eating and serving areas, as well as in rooms with which they are connected by open doors. The material used must be of a type that can be cleaned easily without losing its absorbent quality. If used over a steam table, it must be resistant to humidity. Noise can be retained within the kitchen and dishwashing area by providing only small windows between those areas and the main dining room.

Health Rooms

School health rooms require a quietness below the 45-decibel level in order to provide an appropriate environment for individual counseling, health examinations, audiometer tests, and other special services. A relatively quiet environment also is desirable in pupils' rest rooms. For these reasons, health rooms should be located in a quiet part of the school building, away from gymnasiums, locker rooms, and bandrooms.

Rooms where hearing tests are conducted should have a sound level below 40 decibels, which means that such a room should be away from operating machinery, heavy corridor traffic, and similar sources of noise. The rooms need to have an anteroom where pupils can wait for their turn to be tested, so that noise will not be generated in the hearing testing room. Connecting the anteroom and the testing room should be solid core flush doors with rubber stripping, good gasketing, and a threshold closer.

Improving Old Buildings

Although attention to acoustics and control of distracting noise are matters which can best be tended to at the time a building is constructed, it frequently is necessary to remodel all or part of an old building. This is true when noise interferes with the conduct of desirable educational activities or produces unpleasant, fatigue-producing situations. A sound-level survey by an acoustical engineer can provide objective data regarding these problems and reveal areas that should be improved by the use of sound absorbing materials.

Essential Parts of the Total Program

Whether in old buildings or in new ones, attention to acoustics and lighting is a matter of fundamental importance in a program to promote healthful living. Present-day knowledge in these areas is much greater than in earlier years, making it possible for modern schools to be much better in these respects than the schools which housed earlier generations of pupils. Good lighting and proper acoustics help to make school buildings pleasant for pupils and teachers and facilitate the effectiveness of learning activities.

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Chapter 10

Air Conditioning, Heating, and Ventilating

The condition of air in a classroom significantly influences the comfort and health of pupils and may affect their rate of learning. The American Society of Heating, Refrigerating and Air Conditioning Engineers is presently conducting research to determine the influence of air quality and thermal characteristics on the productivity and learning of men and women in college work. To date, all too often air conditioning, heating, and ventilating of classrooms have been considered as irrelevant or inconsequential factors in the classroom environment.

From studies of air quality and the characteristics of enclosed environments much fundamental information has been derived. Five basic physical and chemical changes occur in the air of an unventilated occupied room: (a) the temperature is increased by liberated body heat, (b) the humidity becomes greater from the breath and perspiration of occupants, (c) the air receives a small amount of partially oxidized organic matter, (d) the oxygen content is reduced, and (e) the carbon dioxide content is increased.

A problem of great importance in school ventilation is control of human heat loss. Each human being is like a heating element giving off heat continuously. This heat must be removed from the environment as fast as it is produced in order for the individual to remain comfortable. Unpleasant air conditions may also be due to bad odors, and these are usually body odors. Thus, two important purposes of ventilation are (a) removal of heat and (b) the establishment of an atmosphere pleasing to the sense of smell.

MORE THAN AESTHETICS

An authoritative report states that "when the only source of contamination is the human occupant, and overheating is not a problem, the minimum quantity of outdoor air needed appears to be that required to remove objectionable body odors. . . ." [1] In view of this statement, why is classroom ventilation needed at all? Is the problem purely an aesthetic one?

Some Basic Premises

It was not until the turn of the century that research brought to light the factors which differentiate "good air" from "bad air." Until that time, it was erroneously believed that exhaled air contained a poisonous substance, anthropotoxin, and that if this was present in large quantities it was harmful to human beings.

In 1905, Flugge, in Breslau, discovered several facts that still serve as a basis for understanding the purposes of heating and ventilating school buildings:

> 1. The chemical changes in the properties of air produced in occupied spaces by the gaseous excreta of human beings do not exert any harmful influence on the health of the occupants.
>
> 2. When conditions detrimental to health are observable in closed and crowded rooms, [symptoms] such as headaches, fatigue, dizziness, nausea, etc. . . . are to be attributed solely to deficient heat loss.
>
> 3. The thermal properties of our atmospheric environment—temperature, moisture, air movement—are of far greater significance for our well-being than the chemical properties of the air. The feelings of freshness which we experience when a closed room is freely ventilated or when we emerge into the outer air are clearly due to a more effective cooling of the body.[2]

Needed Amounts of Air

The amount of air needed to remove odors from a classroom varies with two factors. One is the amount of air in proportion to the number of persons in a room, expressed as cubic feet of air per person. The other is the amount of odor in the classroom. The latter factor reflects pupils' practices relating to body cleanliness and dental hygiene and frequently is related to the socioeconomic level of the community in which the school is located.

Table 1, developed by Yaglou, Riley, and Coggins, shows the minimum outdoor air required per person per minute to remove objectionable body odors under laboratory conditions. The needed rate of air change ranges from 7 to 38 cubic feet per minute per

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[1] American Society of Heating, Refrigerating and Air Conditioning Engineers. *ASHRAE Guide and Data Book: Fundamentals and Equipment for 1965 and 1966.* New York: the Society, 1965. p. 101.

[2] Winslow, C. E. A., and Herrington, L. P. *Temperature and Human Life.* Princeton, N.J.: Princeton University Press, 1949. pp. 170-71.

TABLE 1 **MINIMUM OUTDOOR AIR REQUIREMENTS TO REMOVE OBJECTIONABLE BODY ODORS UNDER LABORATORY CONDITIONS**

Type of occupants	Air space per person in cubic feet	Outdoor air supply per person per minute in cubic feet
Sedentary adults of average socioeconomic status	100	25
	200	16
	300	12
	500	7
Laborers	200	23
Grade school children of lower socioeconomic status	200	38
Grade school children of average socioeconomic status	100	29
	200	21
	300	17
	500	11
Children attending private grade school	100	22

Source:
American Society of Heating, Refrigerating and Air Conditioning Engineers. *ASHRAE Guide and Data Book: Fundamentals and Equipment for 1965 and 1966.* New York: the Society, 1965. p. 102.

person. With only a few persons in a room, leakage around doors and windows in cold weather and open windows in warm weather will provide the necessary air change. A space allotment of 400 cubic feet per person means only one and one-half air changes per hour are needed to ventilate at the rate of 10 cubic feet per minute.

Another approach to determining the amount of fresh air required in schoolrooms is based upon the floor area of the various rooms. Table 2 on page 186 indicates the minimum amount of fresh air that should be circulated through types of schoolrooms.

Relationships Between Odor and Appetite

Studies have been made to determine the physiological effect of odors upon appetite. In one series of experiments—

> temperature conditions were kept uniformly constant and comfortable, but on some days fresh air was supplied, while on other days the air of the room was allowed to accumulate any chemical effluvia contributed by the occupants. A standard luncheon was served to the subjects in the chamber and the amount of food consumed was determined by weighing the amounts left on the

TABLE 2 **MINIMUM AMOUNTS OF AIR TO BE CIRCULATED PER MINUTE THROUGH SCHOOLROOMS, BY TYPE**

Type of schoolroom	Cubic feet of fresh air per minute per square foot of floor area
Classrooms: study, reading, relaxation rooms, and libraries	0.5
Gymnasiums, locker rooms, and toilet rooms	2.0
Laboratories (no exhaust system on hoods)	2.0
Laboratories (exhaust system on hoods)	1.0
Lunchrooms	1.5
Kitchens	equal to the amount of air exhausted by mechanical exhaust systems in hoods over cooking equipment

Source:

American School and University. *American School and University* 36: 37; February 1964.

plates. In four series of experiments (each series including 71 to 100 meals) the excess of calories consumed on fresh days as compared with stale-air days was respectively 4.4, 6.8, 8.6 and 13.6 percent. Comfort votes indicated no conscious preference for fresh-air days (since persons present in a room in which odors are slowly accumulating do not perceive the fact); but it seems apparent that the presence of body odors did interfere with the appetite for food.[3]

From these studies, the conclusion was drawn that no special provision is needed for controlling chemical purity in an ordinary dwelling (excluding the removal of fumes from heating appliances). In larger occupied spaces, practices should be designed to facilitate the removal of body heat, rather than to control the chemical properties of the air.

Ventilation and Efficiency

Classrooms need ventilation to provide comfort and efficiency, not just to remove body odors. In controlled experiments to determine the relationship of temperature to efficiency, four different atmospheric conditions were produced: 68°F. with a fresh-air supply of 45 cubic feet per minute per person; 68°F. with stagnant air; 75° F. with fresh air; and 75° F. with stagnant air. The relative humidity was kept at between 49 and 54 percent. The experiment was conducted as follows:

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[3] Winslow and Herrington, *op. cit.*, pp. 171-72.

For two work periods of one hour, each of the subjects lifted a 5-pound iron dumbbell through a distance of 2¼ feet as many times as he chose, with no urging from the observer, but with a small incentive bonus (beyond his regular salary) on the basis of the amount of work performed, as recorded by an automatic counter. The results, for four subjects over a period of 20 days, were as follows:

	Condition			
	Cool fresh air	Cool stagnant air	Warm fresh air	Warm stagnant air
Foot-pounds of work	26,711	24,359	22,771	20,481

The results are impressive; the greatest amount of work was accomplished in cool fresh air. In cool stagnant air, productivity was reduced by 9 percent; by 15 percent in warm fresh air; and by 23 percent in warm stagnant air. Thus, an increase in air temperature from 68°F. to 75°F. and the elimination of air movement cut down the work accomplished by nearly one-quarter.[4]

Effective Temperature

Thermal comfort of classrooms is usually measured and controlled by the dry-bulb temperature reading, i.e., the ambient air temperature. However, the sensations of comfort or discomfort from heat and cold are determined largely by physiological responses to humidity, air movement, and radiant heat in addition to the ambient air temperature. The most widely known scheme for indicating the thermal significance of environment based upon physiological responses is the effecitve temperature (ET) scheme developed by a research team in the American Society of Heating and Ventilating Engineers (now the American Society of Heating, Refrigerating and Air Conditioning Engineers). Effective temperature is an index of the comparative sensation of warmth or coolness of an environment to a condition of still air with the radiant temperature and the dry- and wet-bulb temperatures of the same values.[5]

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[4] Winslow and Herrington, *op. cit.*, p.177.

[5] American Society of Heating, Refrigerating and Air Conditioning Engineers, *op. cit.*, p. 114.

Studies by the American Society of Heating, Refrigerating and Air Conditioning Engineers and others indicate a variation in preference of different populations for effective temperature that produces a feeling of comfort. The values range from 69°F. to 73°F. Age, sex, geographical area, and season of the year influence the effective temperature that is comfortable to the majority.

Temperature and Efficiency

Studies have been made in regard to the relationship between efficiency and temperature. Herrington quotes studies which indicate that the proper control of indoor atmosphere results in increased comfort, improved efficiency in work, and lowered accident and illness rates. One of the most interesting of these studies relates to the effects of heat on wireless operators:

> In long periods of code reception, errors increased from an average of 12 per hour to more than 90 per hour as Effective Temperature was increased from 79° to 97°F. Such data are convincing evidence of the deleterious effect of heat stress on human adjustment.[7]

Very few studies on thermal comfort have been conducted using children of school age as test subjects. One study, performed in Canada, measured the thermal environment in degrees Fahrenheit of Effective Temperature (FET). The results showed a range of effective temperatures from 66° FET to 75° FET for summer conditions with maximum comfort at 70.5° FET. With 50 percent relative humidity, this figure corresponds to a 75.5°F. dry-bulb air temperature reading. For winter conditions the range of effective temperature was 57° FET to 73° FET with maximum comfort at 66.5° FET. This latter condition is attained by a dry-bulb air temperature reading of 71°F. and a relative humidity of 35 percent.

These investigators observed that the results of this study were affected by the variety of clothing worn and that maximum comfort conditions for girls differed from those for boys.[8]

No one disputes the fact that there is a close relationship between thermal environment and human activity. Cold surroundings increase the need for physical activity just to stay warm; warm surroundings reverse the process and a person decreases his bodily movements, engaging in as little activity as possible. One investigator suggests that in children "reactions to the thermal environment are more direct and natural than in adults—a cold child is restless, constantly in motion, enabling a return of the balance between his heat production and his heat loss; an overheated child relaxes into daydreaming, abandoning efforts at mental concentration."[9]

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[7] Herrington, L. P. "Effect of Thermal Environment on Human Action." *American School and University*. New York: American School Publishing Corp., 1952. pp. 367-76.

[8] School Environments Research. *SER 2: Environmental Evaluations*. Ann Arbor, Mich.: Architectural Research Laboratory, University of Michigan, 1965. p. 97.

All data point to the importance of a classroom temperature that bears a relationship to the kind of activity conducted therein and to the amount of concentration needed for the learning situation at hand. Proper control of the thermal atmosphere promotes comfort and facilitates the learning process.

CONDITIONS TO BE MET IN SCHOOLS

Some air temperatures are considered comfortable; others, uncomfortable. Some make activity pleasant; others make it a chore. Early studies indicated an air temperature of 68° F. as desirable for the classroom. This figure was arrived at because experiments showed that—

> 68° F. or 75° F. was definitely preferred to 86° F., and that the performance of physical work was reduced at 75° F. as compared with 68° F. . . . Votes of observers and teachers and students . . . seemed to indicate a preference for the range between 65° F. and 72° F.[10]

These findings cannot be presumed to be correct in all situations since there are six important factors which affect optimum air temperature: the environmental factors of (a) radiative effect, (b) air movement, and (c) vertical temperature differences, and the individual factors of (d) metabolism, (e) clothing, and (f) acclimatization.

Air Temperature and Operative Temperature

From the point of view of schools, the most important considerations in heating buildings during cold weather are air temperature and radiant temperature, since if these are properly controlled, air movement and humidity do not usually significantly influence health or comfort. Radiant temperature refers to the temperature of such surfaces as walls, windows, human bodies, and radiators. Large glass areas in classrooms tend to lower the radiant temperature. The combined effect of air temperature and mean radiant temperature is called the "operative temperature." This has been defined as "an expression of the combined cooling and/or heating effect of the physical surroundings and the surrounding air, taking into account spatial and postural factors of air movement." [11] Operative temperature in classrooms is frequently one or two degrees lower than air temperature except for those spaces which are heated by radiant panels located in either the floors, walls, or ceilings, or in combination. Relatively few schools are heated by radiant panels as yet.

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[9] Wright, Henry. "Classroom Heating and Ventilating." *American School and University*. New York: American School Publishing Corp., 1951. pp. 197-216.

[10] Winslow and Herrington, *op. cit.*, p. 186-87

Air temperature on floor level may vary considerably from that at knee or ceiling level. Ideally, wide variations should not exist, but the fact that they do exist justifies the need to locate room thermometers at knee or hip level.

Desirable Classroom Standards

Desirable levels of classroom temperature vary in different sections of the country and with the seasons. During winter months when many schools must be heated, a range from 68° F. to 76° F. dry bulb is suggested. When pupils are moderately active, the lower temperature is desirable; when comparatively inactive, the higher. For gymnasiums, a temperature of 65° F. or slightly lower is recommended.

For elementary school children, investigations indicate that temperatures in the lower part of the range would apply because young children have a higher metabolic rate than adults and are more active. Wright suggests that "for the lower grade classroom, in which considerable physical activity is permitted and encouraged [the optimum operative temperature] must be in the neighborhood of 70 degrees, and might be lower," [12] but this figure might be increased to 76° F. in the upper grades. Here physical activity is generally decreased and mental activity increased.

Since one purpose of heating classrooms is to promote comfort, a criterion for the attainment of this goal is the feelings of pupils. However, overheating is to be avoided, for it saps energy and produces listlessness. Moreover, the temperature in a classroom can increase so gradually that it is unnoticed. A classroom thermometer is recommended for each classroom, preferably located at seat level on an inside wall. Frequent reading of the thermometer provides a good basis for regulatory efforts. Control of classroom temperatures by means of individual room thermostats is simple, convenient, and reliable.

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[11] Wright, *op. cit.*

[12] *Ibid.*

Humidity Control

Humidity, or moisture in the air, affects comfort. Relative humidity is the proportion of water vapor in air at a specified temperature in relation to the amount that air would contain if completely saturated. When air is heated, the relative humidity decreases. This, in turn, requires that the ambient air temperature be increased to maintain comfortable conditions. However, "the effect of the humidity of air on the interactions of a human body and its thermally related atmosphere has in times past been overestimated."[13] Relative humidity is of some importance when considering the survival rates of air-borne organisms. Studies indicate that the lowest survival rates of air-borne bacteria occur when the relative humidity is approximately 50 percent.[14]

Low relative humidity may cause excessive drying of the mucous membranes of the nose and throat and thereby contribute to infections of the upper respiratory tract.

In cool climates, humidity control during the heating season may be desirable. Generally, unit humidifiers are not acceptable for use in classrooms. Humidity is best controlled in a central system. Caution should be exercised to keep the amount of water vapor in the heated air below the dew point of such cold surfaces as windows and exterior walls. Failure to do so will cause condensation of water vapor on these surfaces, and the collection of water so formed may create serious problems.

Air Needs

The amount of air needed to circulate in a building varies according to the type and use of the building and such other factors as locality, climate, height of rooms, floor area, window area, extent of occupancy, and the operation of the system of supply. Also, correct air distribution is essential in warm air heating, ventilating, and air conditioning systems.

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[13] School Environments Research, *op. cit.*, p. 2.

[14] Dunklin, E. W., and Puck, T. T. "The Lethal Effect of Relative Humidity on Bacteria." *Journal of Experimental Medicine* 87: 87-101; 1948.

There is not complete agreement on ventilation requirements. The Committee on Atmospheric Comfort of the American Public Health Association recommends not less than 15 cubic feet of air per minute per person for conditions wherein the occupants are performing light work. This is raised to 20 cubic feet for greater activity.[15]

An elementary school classroom may contain 850 square feet with a 10-foot ceiling, giving 8,500 cubic feet of space. If used for an average of 27 pupils, this will provide approximately 300 cubic feet of air per pupil which, according to Table 1 on page 185 would indicate need for the introduction of about 17 cubic feet of outside air per minute per person, or 459 cubic feet per minute.

Approximately 10 cubic feet of air per minute per pupil is a practical minimum under normal conditions. In many situations, air intake through windows and simple mechanical exhaust suffices to meet this need.

Rate of movement of air in a room is important in determining thermal comfort. Effective temperature is influenced by air movement. ASHRAE recommends that, when heating a room, room air velocities be kept below 20 to 50 feet per minute.[16]

If cooling is desired, higher rates of air movement may be desirable, since movement of air increases the cooling effect of air and thus influences comfort. However, whether cooling or warming, air movement in classrooms should be barely discernible, normally, and should not be sufficient to produce drafts.

Cooling of air in schools, particularly those located in predominately warm climates, is becoming increasingly popular. There is some controversy concerning the degree to which the air should be cooled and conditioned. One person reports, "A balance between ideal thermal limits and economics dictates an inside cooling design condition of about 76°, with 50% inside relative humidity." [17]

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[15] American Public Health Association, Committee on Atmospheric Comfort. "Thermal Standards in Industry." *American Journal of Public Health.* Yearbook, Part II, Vol. 40. May 1950. pp. 131-40.

[16] American Society of Heating, Refrigerating and Air Conditioning Engineers, *op. cit.*, p. 538.

[17] Boyd, R. L. "Performance Criteria for Air Conditioning." *American School and University.* New York: American School Publishing Corp., 1967. p. 35.

Air Conditioning

To many people, including school officials, air conditioning is synonymous with air cooling. It is more than this. By definition, air conditioning is "a process of treating air so as to control simultaneously its temperature, humidity, cleanliness, and distribution to meet the requirements of the conditioned space." [18] Ideally, every school should be air-conditioned. An air conditioning system provides positive control over ventilation, air temperature, and humidity and is a means of removing many pollutants. Air is heated in cold weather and cooled in hot weather, and in each instance relative humidity may be adjusted to produce comfortable conditions. The cooling procedure is of particular importance in areas which experience prolonged periods of excessive heat.

The air conditioning equipment used in schools may be a unit or room-type conditioner or a central air conditioning system. The room-type unit is usually of the console or window style and most frequently is used for air cooling purposes only. Most units of this type are not designed to heat the room, although some of the later designs have this capability.

The room-type air conditioning unit has advantages and disadvantages. The primary advantage is elimination of the need for extensive duct work. Consequently, this type of air conditioning unit may be desirable for installation in existing schools.

The disadvantages include (a) greater installation costs in new buildings; (b) higher operating costs; (c) increased maintenance requirements; and (d) objectionable noise, in some instances.

Central air conditioning is usually preferred for new schools, particularly if the building is to be heated by a central forced hot air system. The additional cost to change from a conventional forced hot air system to an air conditioning system with cooling and humidity control is not appreciable when all the benefits are considered.

Air conditioning equipment is complex; design and installation require specialized knowledge and skill.

Differences Due to Age

Age of pupils is an important consideration in determining the heating and ventilating needs of school buildings. As stated previously, the combined factors of higher basal metabolism and increased activity result in young children's being comfortable at lower temperatures than adults. Adjustment to these differences may best be achieved through variations in clothing. When classroom conditions are adjusted to the needs and comfort of pupils, as they should be, adults may need to wear more or heavier clothing than the pupils.

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[18] American Society of Heating, Refrigerating and Air Conditioning Engineers, *op. cit.*, p. 951.

Air Sterilization

The fact that bacteria in air can be killed by ultraviolet irradiation or by spraying with triethylene glycol vapor has led to the hope that the incidence of colds and other communicable diseases could be reduced by such measures. However, up to the present time, evidence of the value of such procedures in schools has not been presented. Neither method of air sterilization is recommended.

Variations Due to Special Demands

The very nature of a school program demands that special conditions be met by heating and ventilating systems. Almost no other type of building is put to such a diversity of uses and to such variation in the times of occupancy. Spaces of relative inactivity, such as classrooms, libraries, lecture rooms, and assembly rooms, have different temperature and ventilation requirements than those of spaces of considerable activity, such as shops, laboratories, homemaking areas, swimming pools, and gymnasiums. The latter require lower temperatures but need more ventilation to remove increased body odors. If the school, or parts of the school, are to be used by the community, even further special regulation is demanded.

The following conditions illustrate the complexity of situations in which school heating and ventilating systems must function:

1. Overnight shutdown of the building
2. Quick normal pickup so that the building is comfortable when pupils arrive
3. Flexibility for evening use by adults, with various spaces isolated so that the whole building does not have to be heated
4. Shutdowns for weekends and vacations, with requirements that certain areas be controlled at certain temperatures (Specific requirements for greenhouses or animal cages in biology laboratories need to be met.)

5. Variations in group activity from sedentary reading and sitting to great physical movement in gymnasiums
6. Variation from the activities on the floor in the kindergarten and first grade to shop programs involving the collection of gases and sawdust, and the like
7. Variations in the climate and the exposure of the room (The effects of outdoor temperature, wind, and humidity vary in different parts of the country.)

Influence of Construction Factors

Different types of school building construction present special types of problems for heating and ventilating. In the Deep South, many schools are built with light wall construction and no insulation, resulting in a low capacity for heat retention. Such construction facilitates fairly rapid heat dissipation. The result is a comfortable condition on warm, sunny days, although more heating capacity is needed on cool, cloudy ones. In some states use is made of one-story schools with outside corridors and concrete slabs on the ground, all of which create new heating problems. This type of construction often uses natural or window ventilation wherein the rooms have high windows on one side (the north or northeast) and low ones on the opposite side. Ventilation of the room can be adjusted by opening or closing the windows.

Construction has a further effect upon the heating system of a school. Heavy construction, for example, means that classrooms will lose heat slowly when the heating plant is shut down, but will require more heat to bring them back to the desired temperature. In turn, light construction means that classrooms will cool off more quickly during a shutdown period but will require less heat to be bought back to comfortable conditions.

State Requirements Must Be Met

The requirements for heating and ventilating vary tremendously from state to state, differing because of climatic conditions and tradition. Although some states have regulations frozen into statutory measures, such a procedure has drawbacks, since a law is sometimes difficult to change even when new conditions or procedures make it antiquated and meaningless.

In general, there are two ways for setting heating and ventilating regulations. One way is to write specific standards as to sizes, ratings, areas, etc. But herein lies a great danger, for in writing overly specific and detailed standards, little is left to the engineer's imagination. The regulations will provide the design for the system. Another way is to have a regulation which states only that "the ventilation must be adequate for the needs of pupils." This requires interpretation of the phrase "needs of pupils."

Somewhere between these two extremes lies what is called the "Performance Standard." This states the performance that is desired but allows the engineer to decide just how he is going to achieve it. With such a standard for heating and ventilating systems, it is hoped that greater progress will be made.

Cost Factors

Heating and ventilating systems are one of the most expensive items in school construction. Every effort should be made to establish standards that will not mean unnecessary expenditures. One of the strongest factors affecting economy in the design of school heating and ventilating systems is the wish of school districts to cut down on any item that might be labeled a "luxury." This is certainly an important consideration for school officials, but in keeping costs to a minimum it should not be forgotten that heating and ventilating equipment needs maintenance and that repairs can be expensive and disrupting.

Heating and ventilating equipment should be so installed that it will be easily accessible. Its selection should be made only after consideration of the overall cost which will include both maintenance and service.

HEATING AND VENTILATING TECHNIQUES

Many diverse methods of heating and ventilating have been used at different times in the history of school buildings. Not every state accepts all methods, but, in one form or another, each method has been used in many different school buildings.

Window Gravity and Unit Ventilators

The simplest and probably least expensive form of ventilation is the intake of fresh air through open windows, with a gravity exhaust either through windows or corridors on the opposite side of the room. The method of heating under these circumstances is usually direct radiation under the windows.

One of the most popular methods is the use of the unit ventilator which draws air through a grill in the wall, blows it over a heat radiating surface, and directs it across the windows toward the ceiling. The unit permits partial or total recirculation of the air in the room and also control of the amount of outside air which is to be admitted. The units themselves have the added appeal of being suitable for combination with storage cabinets or bookshelves.

Hot Air Arrangements

Another system, central hot air, operates by circulating heated air through ducts from a central hot air furnace. This system is used with considerable success. Frequently, a central boiler plant generates steam which is sent to heat exchangers located in various parts of the building or buildings. Here air is introduced and heated by being passed over the steam coils. Hot air then runs out from the heat exchanger to the classrooms. Experiments are being conducted with the introduction of residential-type boilers for hot air furnaces in different locations around the school campus or in various school buildings. These small boilers may be somewhat more expensive to operate since they generally require a lighter and more expensive grade of fuel oil. This system may be preferred where natural gas is used.

Panel Heating

Some schools use panel heating. Basically, this method heats large areas of the interior room surfaces to between 80° F. and 125° F. The heating may be accomplished with warm water piping, warm air ducts, or low temperature electrical resistance components. These are embedded in or located in back of the surfaces of the ceiling, wall, or floor. Usually this system is used as a supplementary device for warming the floors in locker rooms and in kindergartens and primary grade classrooms where considerable activity may take place on the floor. Ceiling panel heating has been used successfully in some of the Southern states, but has not come into general use in the North. There is considerable promise that ceiling panel heating will become more economical; rapid developments in this field may be expected.

A Complex Job

The job that heating and ventilating systems have to do in schools is highly important. In general, heating and ventilating should provide classroom temperatures at seat level between 68° F. and 76° F., with slightly lower temperatures for areas where pupils are active; air movement that is barely discernible; and a minimum air exchange of 10 cubic feet per person per minute. Such conditions promote comfort and increase the efficiency of pupils' work.

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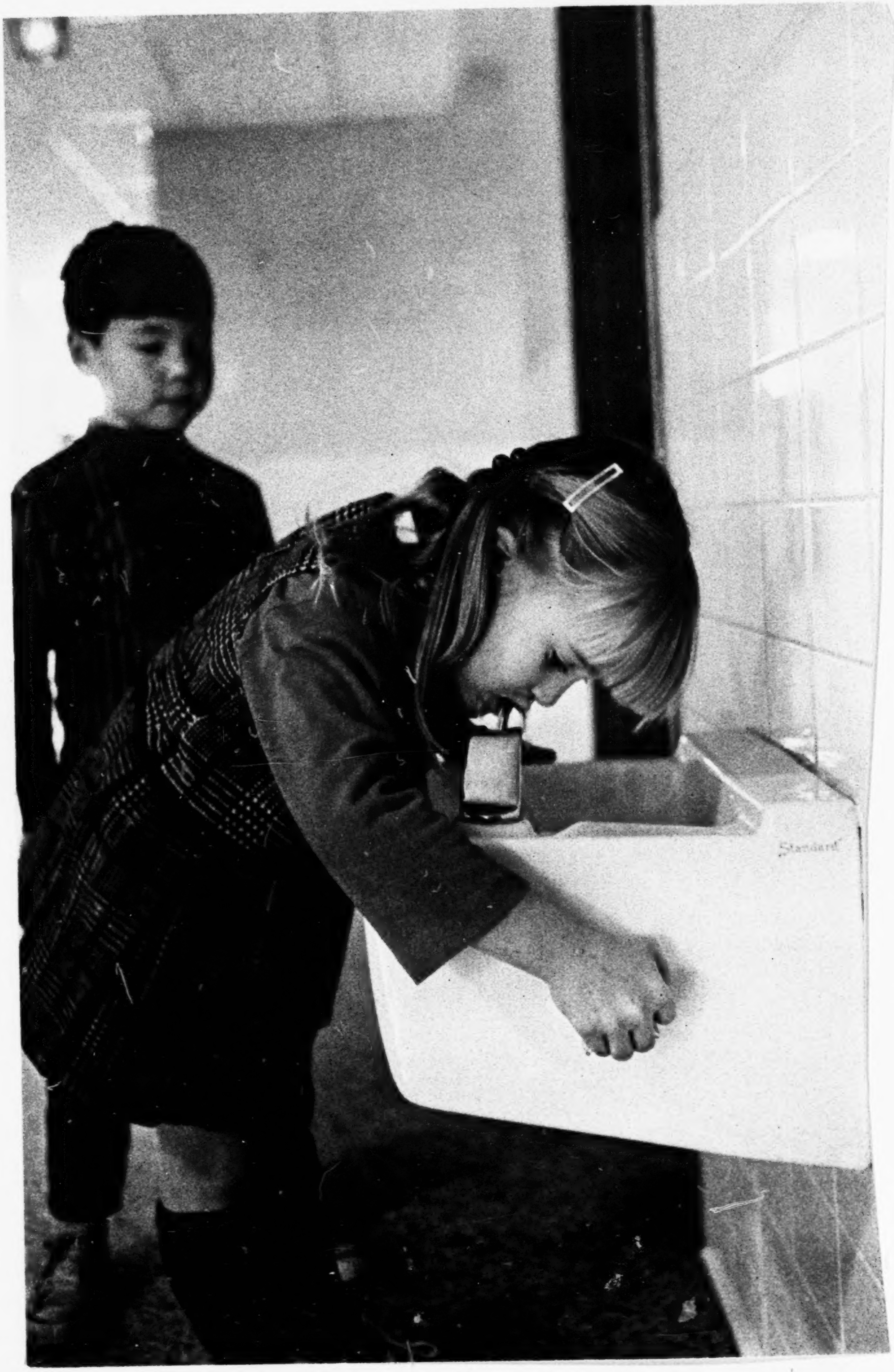
Standard

Chapter 11

Water Supply, Plumbing, and Waste Disposal

A primary requisite for safeguarding the health of pupils is an ample amount of safe water, delivered under sufficient pressure to properly designed plumbing fixtures. The plumbing fixtures need to be served by a drainage system designed for the prompt and proper removal of wastes to a suitable point of disposal. Any break in this chain will unnecessarily expose the school population to disease organisms, particularly those of the digestive tract. Contaminated water supplies have caused outbreaks of typhoid fever, bacillary and amoebic dysentery, and gastroenteritis.

The old concept that a hand-pumped well and a sanitary privy constitute proper water supply and waste disposal systems has been disproved. Conclusive evidence is available to show a lower incidence of enteric disease where modern sanitary facilities are provided. Fortunately, improved standards for school construction and a realization of the need for modern plumbing both in urban and rural areas are factors encouraging the replacement of substandard facilities.

Schools should teach pupils how to live healthfully. Concepts of proper environmental conditions and of desirable sanitary practice are satisfactorily taught only in schools equipped with appropriate sanitary facilities. Failure to observe this principle is inexcusable and inconsistent with the American standard of living.

Teaching about sanitary facilities and practices should be conducted with full realization that such teaching will in time improve sanitary conditions in homes and in the total community. The United States is replete with examples of places where this has occurred.

SECURING ADEQUATE SUPPLIES OF SAFE WATER

Water is necessary for sustaining life, for personal cleanliness, and for the removal of wastes. Both quality and quantity are important. It is desirable that school and health personnel understand how water acquires its characteristics and what is involved in the proper development of safe water supply. Water is obtained from either surface or underground sources. When obtained from the former, water usually requires a high degree of treatment to make it safe; when obtained from the latter, it is generally safe.

Schools served by municipal or public water supply systems are fortunate in that the waterworks authority is responsible for the quality of the water delivered to the school. When a public supply is not available, the school authorities must assume responsibility for the construction and maintenance of a water supply.

Ground Water Characteristics

Water in the ground originates from surface water. The filtering of surface water through the soil and then through underlying subsoil formations controls the chemical and bacteriological characteristics of ground water. In its travels, the water dissolves certain minerals. At the same time, it undergoes a process of filtration which removes many bacteria; as surface water percolates through the soil and underlying sand strata, bacteria and organic material are filtered out.

Filtration does not effectively purify water in areas where subsurface formations include creviced limestone or rock. Under these circumstances, bacteria may not be filtered from the water since the openings through which it percolates are too large to remove bacteria.

A ground water supply of satisfactory bacteriological quality is available in all but a few parts of the country by means of a properly located and constructed well. Its quality should be confirmed, however, by appropriate bacteriological tests performed by qualified personnel of public health laboratories.

Chemical and Physical Components

Dissolved chemicals have varying effects on water. So-called "hard" water contains appreciable quantities of the carbonates and sulfates of calcium and magnesium. These compounds increase the consumption of soap and cause scale formation in boilers. Hardness may be removed in various ways. For school installations, a zeolite softener provides a convenient way to remove substances which cause "hardness." The softening is accomplished by the exchange of calcium and magnesium for sodium. When its effectiveness is exhausted, the softener can be recharged by passing a concentrated brine solution through it.

Water with high concentrations of sulfates (Epsom and Glauber's salts) may produce diarrhea and cramps in people who drink it, although in many cases an individual becomes adjusted to the supply and its effect will not be noticeable. There may be present a wide variety of other chemicals, some of which may be toxic in excessive amounts. Arsenic, vanadium, selenium, and lead may be found in water where ore deposits of these elements occur. High chlorides occur naturally in some areas, but may indicate pollution with sewage.

Fluorides also occur naturally in some ground water supplies. If the fluoride content of water is approximately 1.0 part per million, the incidence of dental decay will be materially reduced in children who consume such water during the period of tooth formation. Some studies indicate that optimal amounts of fluoride may benefit the bone structure of adults, particularly older adults. When a water supply is deficient in fluoride, this chemical may be added in order to bring it up to a desirable level. In the case of individual school systems, however, this practice is recommended only when close and continuing surveillance over the addition of fluoride can be assured.

Turbidity, or cloudiness, is objectionable in a water supply both from an aesthetic viewpoint and because it may indicate inadequate protection from surface wash and possible bacterial contamination.

A brownish or reddish color may be observed in water containing iron. This results from the oxidation of iron compounds. While having no health significance, a high concentration of these compounds makes water objectionable. The oxidized iron may be removed by filtration through a gravel or similar filter.

With the increasing use of radioactive materials, the water supply may need to be checked as to radioactivity. Tests for this purpose are complicated and difficult to perform and need to be made only when radioactivity is suspected. State health agencies are prepared to run tests on chemicals in water supplies and should be requested to do so on occasions when some change in chemical composition is suspected. Ground water supplies do not normally vary as to chemical composition.

Bacteriological Quality

From the point of view of health, the bacteriological quality of water is of utmost importance.[1] If the source of water supply is satisfactory and the methods used in withdrawing it from the ground are in keeping with sanitary principles, the water should be bacteriologically satisfactory. Experience has shown, however, that this ideal situation does not always exist. Consequently, it is necessary to arrange for periodic bacteriological examinations. Organisms indicating contamination are the coliform group, normally found in the intestinal tracts of animals and man. While not normally pathogenic (disease producing), their presence in a water supply is presumptive evidence of sewage pollution.

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[1] U.S. Department of Health, Education, and Welfare, Public Health Service. *Public Health Service Drinking Water Standards.* Public Health Service Publication No. 956. Washington, D.C.: Government Printing Office, 1962.

Technical information and advice concerning the bacteriological quality of water are available from state and local health authorities. They will study the area from which the water comes and the methods used in distributing it. Such information will be supplemented by bacteriologic examination of water samples. Samples must be obtained carefully, and the results of examinations interpreted by one with training and experience in water analysis. When contamination is found, an investigation should be made to determine its source and to prevent continued contamination. It may be necessary to chlorinate the water supply to disinfect it. The assistance of the health authorities is essential in the chlorination of water.

Quantity of Water Required

Each school should have an ample supply of potable water under pressure to serve the installed plumbing fixtures. The quantity of water available to a school with water-supplied fixtures should be at least 20 gallons per person per day. If showers and kitchen facilities are installed, the minimum quantity available should be 25 gallons per person per day. Adjustments to these figures are required to meet the needs of special water-using facilities such as swimming pools, air conditioning, and lawn watering systems.

Meeting Water Needs of Rural Schools

Surface water is not recommended as a source for a school water supply. Surface water supplies must undergo sedimentation, filtration, and chlorination to assure a continuing water supply of satisfactory sanitary quality. Economic considerations, both construction and operational costs, preclude the installation and operation of a water treatment plant to serve the average rural school; furthermore, such plants require a trained operator. Of course, in areas where subsurface water is not available, surface supplies must be used. In such instances, a consulting engineer, competent in the water supply field, should design the plant. In addition, provisions should be made for continuing surveillance of its operation. Local health agencies can usually provide this type of assistance.

Where municipal or community water supplies are not available, the most satisfactory source of water is a properly located, constructed, and operated well. Locating a well requires knowledge of the geological, hydrological, and bacteriological factors that affect the quality and quantity of water. Data on these points may usually be obtained from the state health department and the geological service. Well drillers operating in a given area normally have extensive data on the presence of ground water and can provide valuable information as to the availability of the supply.

The primary consideration in the development of a water supply source is the selection of the site. By utilizing natural protective features, the possibility of contamination can be reduced to a minimum. The well should be at a higher elevation than possible sources of contamination, and surface drainage should be away from the well. The site should not be subject to flooding.

The minimum distance from a ground water supply to such sources of contamination as sewers, septic tanks, seepage pits, cesspools, and surface water is stipulated in health department regulations. The minimum distance required varies from 50 to 200 feet.

The Well and the Pump

The following principles based on a report of a Joint Committee on Rural Sanitation [2] should be observed in the construction of any type of well. The water-bearing stratum should be not less than 10 feet below the ground surface, preferably 20 feet below. The well should be provided with an outside, watertight casing. The annular opening between the casing and earth should be grouted. The well should have a cover which overlaps the casing or pipe sleeves.

Pumps should be so constructed and installed as to prevent entrance of contaminating substances into the water supply. Slotted or open pumpheads are not satisfactory. Priming should not be necessary to operate the pump; priming water has frequently caused contamination of a well. A pump should not be located in a well pit because flooding may cause contamination of water. The use of submersible-type pumps or the use of approved underground discharge units has simplified the elimination of well pits and their attendant hazards.

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[2] U.S. Department of Health, Education, and Welfare, Public Health Service, Joint Committee on Rural Sanitation. *Individual Water Supply Systems.* Public Health Service Publication No. 24. Washington, D.C.: Government Printing Office, 1962.

The well and distribution system should be disinfected after construction or repair to remove contamination which may occur during such work. The conventional method of disinfection consists of treatment with calcium hypochlorite. The amounts and time required will vary with the situation; assistance and advice should be obtained from appropriate health authorities.

Water Service Lines

The water service pipe from the public main or the well to the school should be in a trench separate from the sewer line and at the distance from the latter specified in state and local regulations.

The service line should be of the right size to maintain proper pressure and rates of flow at all fixtures and should be capable of maintaining a minimum pressure of 8 pounds per square inch for all fixtures except water closets supplied through flushometer valves, for which the minimum pressure should be 15 pounds per square inch. Some state health departments recommend a minimum of 20 pounds per square inch on the first floor of all public buildings.

PLUMBING SYSTEMS AND FIXTURES

The plumbing system includes the water supply and distribution pipes; the plumbing fixtures and traps; the soil, waste, and vent pipes; and the devices and equipment connected thereto. The basic purpose of the system is to supply water which is free from contamination to the various fixtures and to remove wastes to some suitable point for disposal, either a municipal sewage system or an individual sewage treatment plant.

The design of a plumbing system constitutes a challenge to the architect or engineer because of the complex nature of the principles of hydraulics and pneumatics which are involved. Fortunately, plumbing codes based on research into the various phenomena which occur within a system, and supplemented by practical experience, offer aid. Such codes present basic criteria to be observed in the design and installation of plumbing systems. Code requirements are directed toward protection of the water supply and assurance of proper waste removal. All plumbing should be installed in accordance with provisions of applicable state or local codes. In the absence of such codes, the provisions of the National Plumbing Code[3] should be observed.

While much has been written on the subject of sewer gas as the cause of specific diseases, there is no substantive evidence to support this thesis. Nevertheless, proper venting of fixtures to maintain trap seals is fully justified for other reasons. Trap seals prevent the entrance of objectionable sewer gas into an occupied building and also the entrance of rodents and insects.

Back-Siphonage: Its Causes and Prevention

Back-siphonage, an important cause of water contamination, results from the flow of polluted water from a plumbing fixture back into a water supply pipe, due to negative pressure (vacuum) in that pipe.[4] Outbreaks of dysentery have been traced to back-siphonage of sewage into the water distribution systems of buildings.

Vacuums in school distribution water systems are not unusual and may result from a number of causes, including—

1. *Shutting off a system and draining it for repairs.* This tends to draw water from the upper sections of the system and, if air is not admitted, creates a vacuum in the piping system. The same situation exists when a break causes the system to drain. This can readily be demonstrated by shutting off the water supply, opening a tap at a lower level, and noting the drawing in of air when a tap at a higher level is opened.
2. *Heavy demands which cause water to be drawn from the higher portions of a piping system.* This is especially common in older buildings in which additional fixtures have been installed. In one hospital survey, it was found that an order had been issued not to draw water from the system at a certain period each morning. Due to the heavy demand for water in the basement laundry, the piping system could not supply water to plumbing fixtures on the upper floors. A similar condition was noted in a new university dormitory, where the water demands on lower floors caused intermittent vacuums in the water system on the upper floors of the structure. An outbreak of brucellosis occurred in a school laboratory building due to

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[3] American Public Health Association and American Society of Mechanical Engineers. *National Plumbing Code.* New York: the Society, 1955.

[4] U.S. Department of Health, Education, and Welfare, Public Health Service. *Water Supply and Plumbing Cross-Connections—Hazards in Household and Community Systems.* Public Health Service Publication No. 957. Washington, D. C.: Government Printing Office, 1962.

vacuums which drew living organisms from a laboratory sink into the water supply system.

3. *Pumps in the system or the action of fire engines pumping from a system.* Such action may reduce pressures to a point below normal.

During periods of negative head, or vacuum, contaminated material may readily be drawn into a water system. This action can be illustrated by using a simple siphon to draw water through a pipe from a higher to a lower elevation. The results are analogous to those in which water from plumbing fixtures is drawn into the water system on lower levels of the same building. The health hazards of this are self-evident. Where water supply lines terminate below the rim of a fixture, a potential situation for back-siphonage is established.

Water closets and urinals served by flushometer valves are another serious source of contamination unless properly protected. The valve is dependent on water pressure for closure. If a vacuum occurs, the contents of the bowl may be drawn into the system through the jet opening at the base of the trap. The air which would be drawn through the rim openings would not be adequate to protect against this condition.

A number of protective measures can be taken to prevent back-siphonage. First, the water distribution system should be properly designed, hydraulically, to assure adequate capacity to supply all fixtures connected to the system, present and future. This involves consideration of (a) the pressure in the water main or service line, (b) the demand for water at the various fixtures, (c) pressure losses due to friction losses in the system, and (d) differences in elevation between the building service line and the highest fixture.

Minimum design pressures of 8 to 15 or 20 pounds per square inch should be maintained at all fixtures for proper operation. Consideration should be given to potential enlargement of a school, requiring extensions to the plumbing system, a not-too-infrequent occurrence. Pipes that will serve the enlarged school should be installed. Methods are available to calculate water pipe size, based on determination of rates of flow with allowance for demand involving the probability of simultaneous rates of flow.[5]

Proper hydraulic design protects against a vacuum in the water distribution system during periods of normal operation, but not against cases where water pressure is lost during periods of shutdown for repair or other emergency. As a result, each fixture must be protected against back-siphonage, either by supplying water to the fixture through an air gap (the preferred method) or by the use of a backflow preventer (vacuum breaker). An air gap is provided by locating the fixture outlet above the flood level rim of the fixture. This can be accomplished readily for wash basins where water pressure is not required for functioning of the fixture. Recommended air gaps for plumbing fixtures are shown below:

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[5] American Public Health Association and American Society of Mechanical Engineers, *op. cit.*

Fixture	*Minimum Air Gap*
Wash basin	1 inch
Sink, laundry tray	1.5 inches
Drinking fountain nozzle	0.75 inch
Outlets over 1 inch in diameter	Twice diameter of outlet

A vacuum breaker must be installed on both water closets and urinals equipped with flushometer valves. This device permits the entrance of air into the water distribution system under conditions of vacuum to prevent the drawing of water from fixtures into the system. The backflow preventer should be located on the discharge side of the last control valve to the fixture and at least 4 inches above the fixture rim. Such devices are subject to mechanical failure, but provide a substantial degree of protection to the water system when properly maintained.

Number of Fixtures Needed

The condition and adequacy of plumbing fixtures affect the health practices and eventually the health of pupils. The teaching of good personal hygiene relating to environmental factors is an essential component of the health education program in the school curriculum. Without suitable facilities, teachers are handicapped in discharging their responsibilities in this area. Lack of adequate facilities will result in undesirable health behavior, difficulties in sanitary maintenance, and, possibly, harmful psychological effects on pupils.

Numerous attempts have been made to standardize the ratio of students to fixtures. Provision of too many fixtures is uneconomical, absorbing funds which might be used to better advantage elsewhere; too few fixtures result in inconvenience, discomfort, and embarrassment. A classic study to secure bases for standardization by a time study of actual fixture utilization in schools was made a number of years ago.[6] The report concluded that standards previously recommended were somewhat excessive and that the number of students per fixture could be increased.

Many state and local jurisdictions specify fixture-pupil ratios to be observed in schools; where such regulations are in force they should be observed. In the absence of such regulations, the ratios appearing in Table 1 may serve as guides.

It must be realized that the figures appearing in Table 1 are minimum and some increases may be desirable based on school layout and supervisional problems. When access to toilet rooms is limited to between-class breaks, some overcrowding may be anticipated.

Location and Characteristics of Fixtures

Where possible there should be a toilet adjacent to each classroom in elementary schools. In many new elementary schools, a small toilet room adjoins kindergarten and first-grade classrooms and is used by both boys and girls, thus simulating home conditions. At the minimum, a toilet room should be provided for each sex on each floor of both elementary and secondary school buildings. The location should be determined with respect to the flow of traffic and particularly with regard to convenient access from libraries, study halls, gymnasiums, and cafeterias.

Handwashing facilities, including hot water and soap, should be available in each toilet room and also adjacent to the cafeteria. Classroom handwashing facilities for lower-grade pupils are an added convenience. Many of the tasks performed by these pupils re-

TABLE 1 | MINIMUM FACILITIES—RATIO OF FIXTURES TO PUPILS

School Level	Water Closets	Urinals	Wash Basins	Drinking Fountains*
Elementary				
Girls	1 fixture to 35 pupils		1 to 40	1 to 100
Boys	1 fixture to 40 pupils	1 to 30	1 to 40	1 to 100
Secondary				
Girls	1 fixture to 45 pupils		1 to 40	1 to 100
Boys	1 fixture to 75 pupils	1 to 30	1 to 40	1 to 100

* At least one fountain per floor.

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[6] American Council on Education, Committee on School Plant Research. *The Utilization of School Sanitary Facilities.* Washington, D.C.: the Council, 1942.

sult in soiled hands, and the teacher is better able to supervise them when they do not have to make frequent trips from the room for handwashing purposes.

The placement of fixtures and appurtenances in toilet rooms has a definite effect on the establishment of proper practices and the maintenance of sanitary conditions. Wash basins should be located between the toilets and the exit and waste towel receptacles between the wash basin and the door. Experience has shown that this arrangement serves to remind pupils to wash their hands and to deposit used paper towels in the receptacle. In girls' toilet rooms, it is recommended that mirrors not be located above the lavatories in order to prevent interference with their use. A shelf should be installed under the mirror for purses, books, etc.

Service sinks should be provided on each floor, preferably in a janitor's closet. A combination faucet (hot and cold water) with hose bib protected by a vacuum breaker should be installed to serve each sink.

Every school with a gymnasium or similar facility should have separate shower facilities for each sex. Shower heads, supplied with hot and cold water, should be provided on the ratio of one to each five pupils for the largest physical education or swimming class anticipated. A number of individual showers should be available for use by pupils desiring privacy. Hot water for showers should be thermostatically controlled so as to prevent scalding.

Fixture Heights

The height of plumbing fixtures should be adapted to the age of those who will use them. Table 2 lists recommended heights.

Plumbing fixtures should be constructed from approved materials, have smooth, impervious surfaces, and be free of concealed fouling areas. Various commercial standards have been established

TABLE 2 | SUGGESTED FIXTURE HEIGHTS

School Level	Water Closets	Wash Basins	Drinking Fountains	
			Indoor	Outdoor
Kindergarten	13"	20"	23"	
Elementary Schools	13½"	25"	28"	30"
Junior High Schools	13½"	30"	30"	30"
Senior High Schools	13½"	30"	36"	36"

for plumbing fixtures, depending on the material of construction.[7] Porcelain, china, enameled cast iron, earthenware, and metal enameled fixtures are the conventional materials used for toilet facilities. Plumbing fixtures should be so installed as to afford easy access for cleaning. Pipes should be run directly to the nearest wall to facilitate cleaning operations. Wall-hung closet bowls have the advantage of permitting easy cleaning of the floor. Toilet seats should be of smooth, nonabsorbent material of the open front type for purposes of cleanliness. The elongated type of toilet bowl is preferred for public use, since it is less likely to become soiled. Wall-mounted foot controls for flushing toilet bowls are recommended.

All wash basins should be supplied with hot and cold running water by means of a combination faucet. The temperature of hot water should not exceed 120° F., to avoid accidental scalding. By use of a combination faucet, a user can temper the water and also wash his hands under running water. Under these circumstances, the stopper for the basin can be eliminated. Some schools use faucets which shut automatically after a brief period of time.

Individual wall-hung urinals are preferred. A trough urinal, whether wall-hung or floor type, is difficult to maintain in a sanitary condition. The wall and floor area adjacent to the urinal should be lined with nonabsorbent material.

Essential Appurtenances

Each toilet stall should be equipped with a fixed holder dispensing either rolled or folded toilet paper. With rolled toilet paper dispensers, a limit control is desirable to prevent waste. Soap dispensers should be provided at each wash basin. Numerous satisfactory types are on the market, dispensing liquid or powdered soap.

A paper towel dispenser or an electric hand dryer should be located on the exit side of the toilet room convenient to the wash basins. A suitable wastepaper receptacle, with a self-closing lid, should be located close to the dispenser. Provision of proper facilities simplifies the task of teaching pupils their responsibilities for maintaining toilet rooms in a sanitary and orderly condition.

In schools enrolling girls approaching puberty, or postpubescent, sanitary napkin and tampon dispensers should be provided in girls toilets, as well as should a receptacle for soiled napkins.

Toilet rooms should be so screened that the interior is not visible from the hall when the entrance door is open; lack of privacy has been found to deter some students from using toilet facilities. Toilet stalls should be equipped with doors.

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[7] American Public Health Association and American Society of Mechanical Engineers, *op. cit.*

The walls and ceilings of the toilet rooms should be finished in light-colored material which can be cleaned easily. Ceramic tile, terrazzo, or similar material provide excellent floors. Glazed tile walls can readily be cleaned. Care should be taken to avoid cracks or concealed spaces which permit the accumulation of dirt, with resultant odors. Interior and exterior corners of walls and floors should be rounded. Both artificial and natural light should be provided; well-illuminated spaces are less likely to become insanitary. Artificial ventilation of toilet rooms, in addition to natural ventilation, is essential. Ventilation ducts from washrooms and toilet rooms should exhaust to the outer air or form an independent system; recirculation of air from such spaces may disseminate odors throughout the building.

Drinking Fountains Should Meet Sanitary Requirements

Fountains constitute the most practical method of dispensing drinking water in schools. The drinking fountain should be of a sanitary design, with an angle-jet stream protected by a guard to prevent contact with the outlet by users. It is important that the fountain, especially the fountainhead, be kept clean at all times. Buildup of scale and organic material around or near the orifice may permit the growth of disease-producing organisms.

At least one drinking fountain should be available on each floor of a school building and one or more in each dining room. Some schools install a drinking fountain in each classroom. Chilled water is desirable if funds are available for such a refinement. Drinking fountain installations by attachment to wash basins in toilet rooms are not approved by public health authorities.

The use of common cups for drinking purposes has long been outlawed by public health authorities. Single-service paper cups are used to good advantage in many rural schools where water under pressure is not available. When such cups are used, a suitable dispenser should protect the cups against contamination from improper handling, and a suitable receptacle should be provided for used cups.

Precautions Regarding Drainage

Most state and local jurisdictions have code requirements controlling the design and installation of the plumbing drainage system.

Where no such codes are in effect, it is recommended that the provision of the National Plumbing Code be observed. The basic criteria for such systems may be summarized as follows:

1. The system should be constructed of durable materials designed to last the life of the structure.
2. The piping should be of proper size to remove the liquid wastes at a suitable rate, so as not to interfere with proper use of the fixtures.
3. The system should be so designed as to permit proper maintenance through installation of adequate cleanouts.
4. All fixtures should be properly trapped to prevent entrance into the building of odors, vermin, and rodents.

Refrigerators and dishwashing machines should not be connected directly to the drainage system. Stoppages in drainlines can result in sewage or waste materials backing into the equipment, with resultant contamination of food. In one school kitchen, a stoppage in the drainline permitted sewage to back into the dishwashing machine, and thence to be pumped over the dishes. The drains from this type of equipment should discharge into the drainage system by means of an air gap. Care should be taken to avoid locating sewer lines over areas where food is prepared, handled, or stored; leakage into these areas from sewers can have serious consequences.

WASTE DISPOSAL

The problem of sewage disposal from schools in many urban areas is relatively simple. Connection to the municipal sewer system provides a convenient and safe method. The responsibility for treatment is thereby passed to the agency responsible for the sewage system.

Pupils in the upper grades and in secondary schools may desirably become acquainted with the way their community disposes of sewage and the means they take to prevent sewage from polluting water supplies.

Where no municipal or community system is available, the school board must assume responsibility for disposal of sewage without creation of a health hazard.

Basic Factors in Sewage Disposal

The type and size of a disposal facility for an individual school will vary considerably, depending on the school location, school enrollment, soil conditions, area available, and other factors affecting methods of disposal.[8]

Opportunities for sewage disposal should be a basic consideration in the selection of a school site. Disposal procedures should be designed to prevent any pollution of the environment. Specifically, this requires measures that will—

1. Prevent pollution of drinking water supplies.
2. Prevent pollution of water used for bathing, recreational purposes, or fish-breeding purposes.
3. Avoid creation of a nuisance, either by odor or by unsightly appearance.
4. Prevent access of flies to sewage.

The basic elements of sewage treatment are twofold, involving the removal of solids from the sewage, followed by treatment to stabilize the effluent. Each of these processes, referred to as primary and secondary treatment, is essential for safe disposal of sewage.

Primary Treatment

Primary treatment is usually achieved by use of a septic or Imhoff tank. The tank retains the sewage for varying periods of time to permit the settlement of solids which are retained in the tank while the clarified sewage is discharged. Economic factors usually dictate a choice between the types of tanks; for the smaller schools, the septic tank is usually provided. State boards of health usually establish criteria to be observed in the selection and use of primary treatment facilities.

The tanks require some degree of supervision. As the solids accumulate, they are subject to anaerobic decomposition, which breaks down the complex organic compounds into simpler substances (ammonia, hydrogen sulfide, methane, carbon dioxide, inert materials). After stabilization and the destruction of disease-producing organisms in the sewage, the remaining solids should be removed in a sanitary manner so as to produce no health hazard or nuisance. There is a widespread misconception that decomposition in the tanks completely removes all solids. This is not true. While there is a substantial reduction in the volume of sewage as a result of decomposition, the residue is sufficient to fill a tank in a period of from one to three years. When the capacity of a tank is exceeded, the solids pass into the secondary treatment facility, where they cause serious interference with the treatment process.

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[8] U.S. Department of Health, Education, and Welfare, Public Health Service. *Manual of Septic Tank Practice.* Public Health Service Publication No. 526. Washington, D.C.: Government Printing Office, 1963.

Personnel charged with responsibility for operation of a sewage treatment plant should be given a standard operating procedure to follow, depending on the type of plant. Techniques and procedures are available which permit one to determine when sludge should be removed from the tank. In many rural schools, it is common practice to remove sludge in the late summer or early fall, prior to the start of each school year, to avoid the withdrawal of undigested material. Frequently commercial firms having special equipment for the purpose are employed for sludge removal operations. Disease-causing organisms may survive in sludge for long periods of time. For this reason, sludge removed from tanks should be disposed of in accord with state and local regulations.

Secondary Treatment

The conventional methods of secondary treatment utilized by schools are soil absorption and a trickling filter. The soil-absorption system is most practical for the average rural school where the subsoil is composed of loose, sandy soil. This consists of disposal of the liquid sewage into the soil through a subsurface drainage system. The drainlines usually consist of open-jointed or perforated tile, concrete, or similar pipe materials laid on a gravel bed. The liquid sewage passes through the openings into the soil. The length of the drainlines is governed by the quantity of liquid to be disposed of and the soil-absorption character of the subsoil. The latter may vary over a wide range and can best be determined by means of percolation tests carried on under proper engineering supervision.

Standard procedures have been established for the conduct and evaluation of such tests. Where the ground water table approaches the surface, or where the permeability of the soil is limited (as when a tight clay subsoil is encountered), the possibility of successful operation of a soil-absorption system is reduced. Conversely, when properly designed and constructed in sandy, loose soil, these systems constitute a satisfactory method of sewage disposal. The health hazards of the system are minimal, and problems of operation are not great.

The trickling-filter installation is a much more complex type of treatment. It involves distributing the clarified sewage on a rock filter bed, 4 to 8 feet in depth; the sewage passes over the rock surfaces and is collected in an underdrain system. The rocks become covered with a bacterial growth which stabilizes the sewage and permits its disposal without nuisance. Special layouts of this type of treatment are suitable for larger schools.

A variation of this system for smaller schools is made possible by the use of an underground filter system. This consists of two lines of tile, one below the other, in a trench or series of trenches with an artificial filtering material between them. Coarse sand or pea gravel is satisfactory. Extreme care should be taken in selecting the point of final disposal, since the degree of treatment does not provide a completely stabilized effluent. At some locations, such as where a public watershed is involved, it may not be permissible to discharge even a treated sewage effluent into a water course, and this should be taken into account in the choice of a site.

It is impossible to generalize on the problem of sewage disposal for different schools. Each installation will have its own peculiar and complex facets which must be considered. *In any case, the system should be designed by a competent engineer experienced in the field of sewage treatment, and the plans should be approved by the departments of health and education having jurisdiction.*

Disposal of Refuse

Refuse includes all garbage, rubbish, ashes, and other wastes, exclusive of sewage. Handling of refuse involves provision of temporary storage facilities, pending collection for final disposal. Care should be taken to avoid creating a harborage for rodents or vermin or causing a fire hazard.

Garbage attracts rodents and insects. Improper handling of garbage results in a tremendous increase in flies during the fly breeding season. The relationship between insects and the transmission of intestinal disease is generally recognized. When garbage is stored on the premises pending disposal, it should be kept in covered, watertight, metal cans.

Frequency of collection and the amount of garbage produced will determine the number of cans to be provided. Where there are large amounts of garbage, it is suggested that a separate, refrigerated garbage storage room be available for can storage.

Garbage cans should be kept clean at all times. When limited numbers are involved, this may be accomplished manually, as required. For larger numbers a can washing device is helpful. Such a device is relatively inexpensive and consists, basically, of a stand with water and steam sprays over which a can may be inverted for flushing and cleaning. The jets in the device should be protected against backflow. Can washing can be done in a separate room reserved for this activity and equipped with adequate floor drainage.

Garbage may be collected by the municipality, incinerated, buried in a sanitary fill, or run into the sewage system through a garbage grinder.

If garbage is incinerated, the temperature of incineration should be high enough (1400° F. or over) to prevent odor. Garbage normally will require auxiliary fuel for proper combustion. Incinerators should be designed and operated so as to eliminate air pollution problems. If disposal is by burying, the garbage should be covered with compacted earth to a depth of 24 inches to prevent access to rodents.

One of the most convenient methods of disposal is by grinding and discharge into a sewer. A commercial type of grinder can be installed in the sink outlet, and the garbage disposed of without recourse to storage. Certain communities, however, impose limitations on the use of these devices, and local regulations should be checked prior to their installation. When the school is served by an individual sewage treatment plant, the additional solids produced by the garbage may require increased sludge storage capacity.

While the installation of a garbage grinder in the school cafeteria may promote better sanitation, there is still need for proper handling of other refuse in a sanitary manner. Such refuse consists mostly of paper or other combustible material. It may readily be disposed of by salvage and sale, by incineration, by burial in a sanitary landfill, or, in urban areas, by municipal collection. When an incinerator is available on the school site, refuse material may be disposed of on a day-to-day basis.

Proper disposal of refuse and sewage and measures to secure and protect a safe water supply are essential to producing a healthful environment and promoting healthful school living.

FOR FURTHER READING

AMERICAN PUBLIC HEALTH ASSOCIATION AND AMERICAN SOCIETY OF MECHANICAL ENGINEERS. *National Plumbing Code.* New York: the Society, 1955.

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Public Health Service Publication No. 956. Washington, D.C.: Government Printing Office, 1962.

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, PUBLIC HEALTH SERVICE. *Water Supply and Plumbing Cross-Connections—Hazards in Household and Community Systems.* Public Health Service Publication No. 957. Washington, D.C.: Government Printing Office, 1962.

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, PUBLIC HEALTH SERVICE, JOINT COMMITTEE ON RURAL SANITATION. *Individual Water Supply Systems.* Public Health Service Publication No. 24. Washington, D.C.: Government Printing Office, 1950.

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, PUBLIC HEALTH SERVICE, JOINT COMMITTEE ON RURAL SANITATION. *Manual of Septic Tank Practice.* Revised edition. Public Health Service Publication No. 526. Washington, D.C.: Government Printing Office, 1967.

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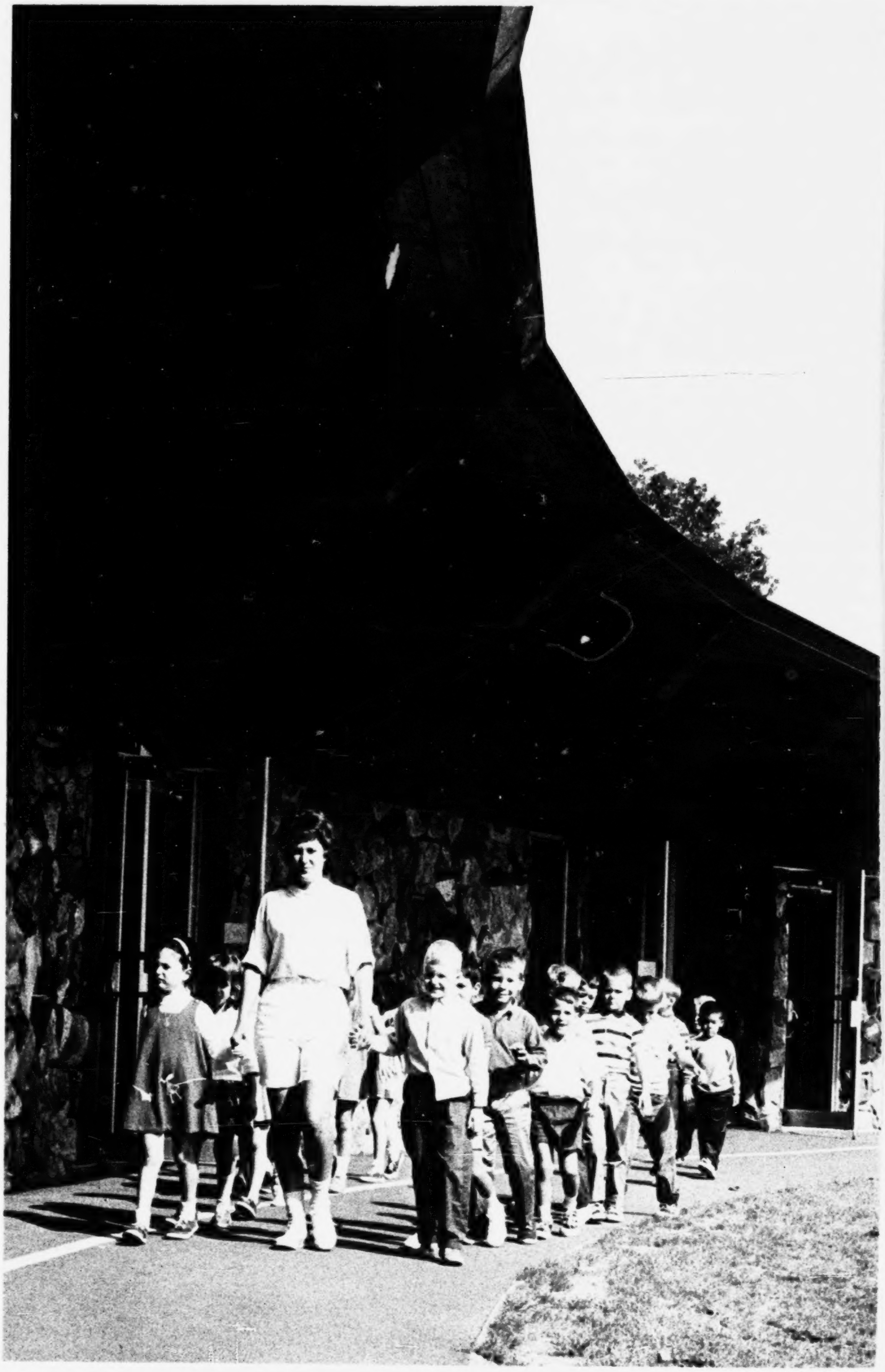

Chapter 12

The Environment for Physical Education and Athletics

Responsibility for sound health practices and healthful conditions for physical education and athletics is shared by many. The board of education and school administration are responsible for seeing that appropriate attention is given to facilities for these activities when planning a new building or remodeling an old one. The school administrator, physical education teacher, coach, custodian, and students should all play a role in the development of health policies. Also, they should all help to maintain facilities in good condition.

In all aspects of education, and particularly in physical education and athletic programs, it is difficult to distinguish between the effects of program and environment. This chapter, however, is concerned primarily with the provision of safe and sanitary conditions for activity programs and the encouragement of desirable health practices in the use of physical education facilities.

Both indoor and outdoor facilities must be available in order to provide the varied and vigorous programs of physical education that are needed by boys and girls of all grade levels. Properly organized activity programs conducted in safe, well-designed facilities provide important educational experiences. Sound development, basic health, and a lifelong interest in physical activity are likely to be encouraged by wholesome environments.

OUTDOOR ACTIVITY FACILITIES

Under moderate climatic conditions, with students properly clothed, outdoor activities are desirable. Fortunate, indeed, are students attending schools in geographic areas that permit the conduct of winter sports in addition to summer activities. At a minimum, most schools can provide field and playground facilities as well as indoor facilities for use during inclement weather and for regular indoor programs.

Playing Fields and Playgrounds

A wide range of vigorous and exciting games and sports is possible on well-kept fields. Perhaps the primary health hazards in this area are lack of proper supervision and safety procedures, overexposure to the sun and heat illness (discussed later in this chapter), and the condition of the field itself.

The playing surface of fields varies with the type of activity for which it is to be used, but usually it is composed of turf or earth, or a combination of turf and earth. Turf may be comprised of a variety of grasses depending upon the soil composition and the climate. Where there is extensive activity, turf can be difficult to maintain. Considerable care in watering and fertilizing may be required.

Earth surfaces such as clay, loam, and sand sometimes present accident hazards. Removal of rocks, filling in holes, and correcting surface unevenness is helpful in reducing falls which may cause injuries.

The proper drainage of fields and playing surfaces is important for maximum utility, to provide safe and consistent footing, and to prevent breeding grounds for mosquitoes and other insects.

Water-base paint, traffic paint, or crushed stone can be used for marking lines on playing areas. These substances do not burn the grass and are preferable to powdered lime which can injure the eyes if accidentally blown or spread by a slide or fall. The paints require frequent replacement since they are eventually cut away with the grass.

Playgrounds usually require durable and easy-to-maintain surfaces due to their heavy use. Turf does not resist heavy wear, particularly under such apparatus as jungle gyms and swings. Varieties of earth may become too muddy or too dry. In the latter case, dust can be a problem from the standpoint of cleanliness and inhalation. The increasing incidence of respiratory diseases, such as emphysema and chronic bronchitis, justifies measures to avoid the exposure of pupils to dust inhalation. The fact that some pupils may have dust allergies is another reason for controlling dust on playgrounds.

Surfaces of asphalt tar, tanbark, and synthetics made of rubber, plastic, mineral fiber, and other substances may be used for playgrounds. Although concrete provides a durable surface, it is too abrasive and not resilient enough for many activities.[1]

For reasons of safety, play fields and playgrounds need to be fenced. This measure is particularly important when the activity areas adjoin heavily traveled roads or streets.

Track and Field Areas

Running tracks and corresponding areas are now being covered by rubber asphalt and synthetic materials that have proved to be quite durable, weather-resistant, and resilient. Falls and collisions are not as nasty or disastrous as when cinders, gravel, and brick dust are used. In addition, they require little maintenance, a factor which tends to offset a somewhat high initial cost.

Adequate space and roped-off areas should be provided for such field events as the shot-put and discus-throw. Landing pits for pole-vaulting and high-jumping now consist of piles of foam rubber or air cushions contained by canvas and rubberized tarpaulins, in place of the sand and sawdust of previous years.

Limited Shelters

Increased out-of-door activities are possible with the provision of limited shelters. Various designs offer protection from rain, wind, and sun and permit control of air temperature, air motion, and humidity. Shelters can be designed and built in consideration of climate, the degree of utilization, and the size and scope of the program.[2]

For all outdoor areas, provision of properly designed drinking fountains and adequate toilet facilities is necessary.

INDOOR PHYSICAL EDUCATION FACILITIES

Gymnasiums and rooms for special activities should be provided for both girls and boys. An adequate professional staff enables the program to reach all students through a variety of activities. Safe and ample space, the use of which is well-organized, is required.

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[1] National Facilities Conference. *Planning Areas and Facilities for Health, Physical Education and Recreation.* Revised edition. Chicago and Washington, D.C.: Athletic Institute and the American Association for Health, Physical Education, and Recreation, a department of the National Education Association, 1965. p. 272.

[2] Wagner, William G.; Evans, Ben H.; and Nowak, Matthew A. *Shelter for Physical Education.* College Station, Tex.: Architectural Research Group of the Texas Engineering Experiment Station, 1961.

The Gymnasium

A well-designed gymnasium provides space for physical education classes, intramural activities, athletics, and community recreation. Gymnasiums can be equipped with movable partitions for separating areas so that different programs can be conducted simultaneously.

Floor space should be provided around basketball courts so that players are not likely to collide with the walls, supports, glass surfaces, benches, or bleachers. Heavy padding or mats should be used to offer protection against collisions with permanent surrounding objects. Doors should not open onto the playing floor. Drinking fountains and expectorant sinks, conveniently located, should neither project from walls nor expose the user to collisions with passing players. Unfortunately, facilities are sometimes built without adequate consideration for the program to be developed. This leads to inadequate space, crowding, accident hazards, and a limited, unsatisfactory experience for students. Space requirements for selected indoor activities are recommended elsewhere.[3]

Multipurpose Rooms

The practice of building multipurpose rooms and combined gymnasium and auditorium facilities is considered to be economical. However, in such instances schedule conflicts occur and activity programs frequently are curtailed. Also, there is a tendency to use tile-covered cement floors to resist wear due to the use of street shoes. This surface makes the multipurpose room less desirable for vigorous activity. A great deal of dust is brought into the area. Equipment and protective mats must be moved more frequently and their useful life is thereby decreased. This encourages the tendency to do without mats, and this, in turn, increases the risk of injury. Multipurpose rooms may find their best use as a supplemental facility to a gymnasium.

Space for Adapted Physical Education

Schools need to provide activity programs for pupils whose condition temporarily or permanently prevents their engaging in the usual program. Rather than being excused from physical education, the temporarily handicapped or convalescent pupil should participate in a program adapted to his particular needs. As stated by one group,

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[3] National Facilities Conference, *op. cit.*, p. 85.

> Excuses from physical education which deprive a young person of desirable developmental experiences in this area should not be granted unless there is a clear and overriding health reason wherein the student cannot participate except in a prescribed program of restricted physical activity. Currently, there is general agreement among both physicians and educators that when *good* programs exist, "blanket" or overall excuses from physical education are unnecessary.[4]

Handicapped pupils need special consideration. These are boys and girls—

> who for some reason cannot take full advantage of the general physical education curriculum, or who need special attention in addition to the regular program. . . . In many instances these youngsters need the values inherent in physical education much more than do children without a physical handicap. . . . Indeed, the number of youngsters who would greatly benefit from an individualized as well as adaptive physical education program is staggering.[5]

Some modified physical education activities can utilize regular facilities; others require a special exercise or remedial activity room or area. The equipment included in such a room or area might include stall bars, wall pulleys, weights, mats, chinning bars, stools, benches, posture grid screens, full-length mirrors, and a variety of exercise and measurement devices.

Participation in school activities by handicapped students in wheelchairs and on crutches can be facilitated by minimizing architectural barriers in school construction. In some states, the law prohibits the construction of a public building that does not provide access for the handicapped. Frequently, relatively inexpensive remodeling or modification of particular parts of an existing building can make it accessible to all. Ramps on walkways, door widths, stair designs, desk and table heights, toilet and shower facilities, elevators, and water fountains should be designed to make various school areas accessible to handicapped pupils.[6]

The advantages of modifying facilities and programs for handicapped pupils are obvious. Less obvious is the fact that nonhandicapped pupils learn to appreciate the value of physical education when they see handicapped persons engaging in activities.

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[4] Committee on Exercise and Physical Fitness, American Medical Association."Classification of Students for Physical Education." *Journal of the American Public Health Association* 199: 265-67; January 23, 1967.

[5] Mathews, Donald K.; Kruse, R.; and Shaw, S. *The Science of Physical Education for Handicapped Children.* New York: Harper & Brothers, 1962. pp. 1-2.

[6] National Facilities Conference, *op. cit.*, pp. 241-54.

Nonhandicapped pupils then develop new respect for the abilities and potentials of the handicapped.

CARE OF CLOTHING AND EQUIPMENT

Healthful school living requires that clothing used by participants in activity programs and the equipment that they use be kept clean. Under modern conditions there is no reason for persistent "athletic aroma" and the frequent spread of skin infections. Whether students wear clean clothing depends to a great extent on instructional and supervisory effectiveness. Gymnasium mats need special attention with respect to cleanliness.

Suits and Uniforms

It is generally accepted that changing clothing, i.e., removing street clothing and substituting clothing suitable for the activity to be engaged in, is good procedure. Of course, if students are participating in a coeducational class in social dancing, they will prefer to wear street clothing. It probably will not be necessary even to suggest that they wear appropriate clothing and be well-groomed.

If the activity is an out-of-doors sport, such as soccer, the participant should wear a suitable outdoor outfit, including warm-up clothing if desired; if the activity is to be in the gymnasium, like tumbling or basketball, the pupil will need quite different clothing. The individual who is to be active can do so easily and freely if he wears an appropriate costume.

Emphasis should be placed on the importance of clean clothing and on how athletic costumes can be maintained at acceptable levels of cleanliness. One technique is to speak individually and in private to those pupils whose clothing does not meet accepted standards of cleanliness. The specific suggestion may be made, where necessary, to "take your outfit home tonight and bring it back washed."

As a last resort, a pupil may be refused admittance to class on the grounds that he is not properly equipped by virtue of wearing a dirty uniform or street clothes. Of course, parents should be informed of regulations and the reasons for them. A regularly scheduled time for each pupil to have his costume laundered is an aid to parents.

Footwear requires special attention. Excessive sweating of the feet and the use of synthetic fiber socks and rubber footwear tend to irritate the skin and predispose it to infection. Changing into clean socks (cotton or wool) at least once a day, wearing gymnasium shoes only during physical education classes, and wearing footwear that promotes air circulation are recommended procedures.

Some schools, particularly secondary schools, operate laundries which care for gymnasium outfits as well as towels. Pupils may be charged a small amount for this service, or the cost may be included in the general school budget.

All uniforms should be marked with a name or initials, using indelible ink, to minimize the exchange of clothing. Lost and stolen clothing can be kept to minor proportions with such identification.

Sanitary Care of Gymnasium Mats

Mats are used for tumbling and wrestling and for protection when using apparatus. While various grades of mats may be purchased at a considerable range in price, it is economical to buy high-quality mats from reputable companies.

From the standpoint of safety, it is important that mats be properly cared for, so that expected protection is available when needed. If padding shifts because the mat has been improperly used by being folded, crushed, or rolled, a participant may be unnecessarily injured.

Most mats today are manufactured of synthetics and foam rubber. These offer greater resilience than conventional mats. They are often lighter and require no extra cover. Lines can be painted on them, and the surface can be easily washed or wiped clean. They are particularly suitable for wall-to-wall and wainscoting applications, as in wrestling facilities.

While canton flannel, which can be removed and washed, has been the recommended covering for conventional mats, thick plastic covers are now commonly used and are, in the long run, quite inexpensive. These may be cleaned easily and quickly by being wet-mopped as needed. "Floor burns" seem to be greatly reduced by the smoothness of the plastic.

A few specific suggestions regarding the care and maintenance of mats follow:

1. Buy mats which may be easily carried. (Exceptions may be made for certain activities in special rooms, such as wrestling.)
2. Keep mats clean by frequent sweeping and vacuuming.
3. Use mat covers which may be cleaned at regular intervals.
4. Carry mats; never drag them.

5. Pile mats in a suitable area.
6. Put the clean, or top, sides together.
7. Prohibit the use of street shoes on mats.
8. Use mats only when they are actually needed for the activity at hand. Mats left lying around on the gymnasium floor may create a real hazard.
9. Have mats repaired whenever cords break or coverings show wear. It is especially important that hand grips be kept in good condition so the mats may be moved easily.

Arrangements should be made to have regulations relating to the use of mats apply to nonschool groups as well as to pupils.

If mats are kept clean by proper use and by being cleaned at regular intervals, it is likely that the spread of certain infectious conditions, such as impetigo and fungous infections, will be reduced.

The instructor of physical education must realize his responsibility in educating pupils to use all equipment properly and safely. If his efforts result in use of the preceding suggestions, it is apparent that a contribution will have been made to safeguarding the health of pupils.

SCHOOL SHOWER FACILITIES

A shower bath with soap and warm water is recommended at the conclusion of vigorous activity. Adequate time should be scheduled for pupils to enjoy a shower, and facilities should provide for convenience and safety. If showers are to contribute to the health of pupils, attention must be given to such factors as location, types of installation, supervision of pupils, and maintenance of sanitary conditions.

Location of Shower Rooms

Showers should adjoin the gymnasium and swimming pool. Shower rooms are best separated from locker rooms and dressing areas by a drying area. This arrangement decreases wet floors in locker rooms and also the amount of moisture in them. Sunlight helps make the area cheerful, and good artificial lighting helps make the room attractive.

Proper heating and ventilation are necessary to keep the area comfortable and to maintain proper humidity levels. Frequently auxiliary exhaust fans are required during peak load hours.

The shower room should have a nonslip floor surface such as ceramic tile or terrazzo. Tile or other materials impervious to moisture should cover walls and ceilings or, at the least, a wainscot of tile should line the walls to a height of 7 or 8 feet. Ceilings should be insulated to prevent condensation. Floors should be sloped to drains located near the base of the wall under the shower heads.

Soap receptacles or dispensers should be provided for each shower head or every two shower heads. Cake soap may create accident hazards and clog drains. Centrally stored liquid soap dispensed through metal tubing requires careful maintenance to prevent clogging. However, some sort of liquid soap system is desirable.

Showers can be made usable for the disabled or handicapped student. Folding "L" seats, handrails, hand-testing outlets, soap trays, and operating valves can be provided at proper heights in separate shower stalls.[7]

Varying opinions are held concerning the comparative value of group-type showers and individual showers. Each type of shower has its advocates and, in the final analysis, the type installed will depend on the number of pupils using the facility at any one time and the available space. When properly used, the group-shower, either a standing central core or on the walls around the room, can be more economical. It also permits more effective supervision. A minimum of 12 to 14 square feet of space is recommended for each shower head. Vandal-proof fixtures should be used.

A few individual booth showers should be provided in both girls' and boys' shower rooms. Frequently, self-conscious youngsters reject showers and physical education programs because they are forced to shower in groups.

Use of Showers

Direct instruction is often necessary to teach young pupils the best techniques for soaping, showering, and drying. This can be a policemanlike task or an educational one, depending on the point of view of the instructor. If there is concern for the individual and what he does for himself now and later, interest will be centered on developing desirable habits and correct attitudes toward the many activities relating to health. The correct way of showering is surely one of these.

Showers should have, in addition to manual temperature controls, a central thermostat to prevent scalding. Hot water temperature should not exceed 120° F. There should also be a control valve that will permit all water to be shut off from one place. This allows the instructor to control all showers at once and to discourage loitering and horseplay.

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[7] National Facilities Conference, *op. cit.*, pp. 164.

Care of Showers

It is desirable to have the custodian scrub the shower room floor daily with hot water and soap. The floor should, of course, be equipped with sufficient drains with removable, noncorroding metal covers. The covers should be removed at regular intervals for cleaning. Plenty of hot water, soap, and "elbow grease" applied with a brush broom or mechanical scrubber, are important elements in the care of a shower room.

The shower room and adjacent drying area should be hosed down under high pressure once a day, at a minimum. This practice significantly reduces the number of colonies and types of dermatophytes (organisms associated with "athlete's foot" and other fungous diseases) found in communal bathhouses.[8] Adequate heating and ventilation should keep the shower room dry when not in use.

Arrangements for Drying

There should be an area between the showers and the locker room where pupils may dry themselves. In a common type of installation, bathers enter one end of the shower room and leave from the other. This keeps a dry passageway for travel from the locker room to showers and provides a different path for travel from the showers back to the locker rooms. Just outside the showers, at the start of the return pathway, is where the drying or toweling area should be located. Adequate warm air should be provided for the comfort of bathers.

Towel Service

Concern for the health of pupils in classes and participants on teams requires that arrangements be made for them to have clean, individual towels for use after bathing. The achievement of this goal requires education of pupils.

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[8] Gip, Lennart. "Investigations of the Occurrence of Dermatophytes on the Floor and in the Air of Indoor Environments." *Acta–Dermato-Venereologica* 46: 1-54; 1966.

Consideration must be given to economic factors, including the cost of towels and of laundering. The traditional practice is to have each pupil bring a towel from home and to take it home at frequent intervals for laundering. Unless carefully supervised, however, this plan may result in certain pupils' using a single towel for an entire semester or even a year without having it washed.

Laundering may be accomplished in one of several ways. Pupils may take their towels home and have them included in the family wash. The school may arrange for a commercial firm to launder towels, the cost being paid by parents on a fee basis. Or, if taxpayers approve, the school may pay for laundry service with school funds.

When locker facilities are inadequate, damp towels may be stored in lockers, thus encouraging mildew on gymnasium clothing and producing the bad odors which characterize some locker rooms. Such practices can largely be avoided, however, through effective education, administration, and supervision.

Locker Rooms

Most schools provide hall lockers for storage of outer clothing, books, and incidentals. Since physical education programs for children in primary grades do not usually require a change of clothing, the hall lockers take care of pupil needs at this grade level. Changing from street shoes to rubber-sole shoes may be accomplished with the use of hall lockers.

Schools should provide the time and facilities for showering and dressing for upper-grade elementary school pupils and secondary school students. In addition, the faculty and other groups using the school should have these facilities available. Their use is to be encouraged if only to provide an opportunity to teach by example. The chief functions of gymnasium lockers are to provide storage space for gymnasium clothes and temporary storage of regular clothing during periods of activity in physical education programs.

Locker Arrangements

Individual full-length lockers are ideal and should be provided if possible. Space should be of prime consideration in planning locker facilities. An area of not less than 600 square feet for lockers, showers, and dressing is recommended for elementary schools.[9] In secondary schools the area needed is larger. The number of lockers is determined by the enrollment, plus a small percentage to handle expansion needs.

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[9] National Facilities Conference, *op. cit.*, p. 159.

The traditional plan, although not the best in all circumstances, provides each student with a half-sized locker (about 12" x 12" x 36"), preferably with a combination lock. If necessary, the lock may also be opened by a master key in the teacher's possession. The number of pupils using the locker room is limited to the number of lockers, and this, in turn, is determined by the area available. If there are enough lockers and they are so assigned that during a particular period the class is not concentrated in any one section, this plan works well.

From the viewpoint of economical use of space, two arrangements have won wide acceptance: the box locker and the basket system. In the former, there are enough full-length or half-length dressing lockers to care for the largest class, with many small box lockers, approximately 12 inches square, spaced at intervals between them. The pupil comes to class, removes his combination lock from the box locker in which he has stored his gymnasium uniform and shoes, places his street clothes in the adjacent dressing locker, puts his combination lock on that, and goes to class. After his shower and toweling, he replaces his uniform in the box locker, locks it, puts on his regular clothes, and moves on to his next class.

Forced ventilation is needed to dry clothing in lockers; otherwise it remains damp and soon produces odors. Clothing may become soiled as the result of being placed next to shoes since the size of the box locker does not permit hanging clothing. If a laundry plan has been worked out, the soiled uniforms, socks, and towel may be removed and clean equipment substituted. In larger schools, a locker room attendant helps to make such a plan function effectively. In smaller places, the custodian may assist pupils and the instructor in accomplishing necessary interchanges.

When a basket system is used, baskets take the place of box lockers. The basket system may function in either of two ways. Groups of heavy wire baskets may be interspersed between dressing lockers, in a manner similar to box lockers, or they may be stored in a separate room. Baskets are more open than box lockers, permitting material stored in them to dry more quickly.

It is desirable to have occasional "locker inspection" which results in the removal of soiled towels and clothing. It is also desirable to have the interiors of lockers cleaned frequently. "Locker room smell" is caused by dried human perspiration on soiled garments; therefore, it is prevented by eliminating the storage of soiled uniforms and towels.

Attention to environmental factors in locker and shower rooms includes consideration of heating as well as the provision of certain facilities and equipment. To promote comfort, the air in these rooms should be between 76° F. and 80° F. Sufficient benches should be provided, anchored to the floor, to take care of the largest class.

Toilet facilities should adjoin locker rooms, but should never be located between a shower room and a swimming pool.

Drinking fountains are essential and should be installed in a well-lighted location at a height suitable for those who will use them. Hairdryers and adequate provisions for sanitary napkins are needed in girls' locker rooms.

SWIMMING POOLS

Recreation in and on the water has grown phenomenally. Swimming is a healthful activity, but it can be hazardous. Programs are designed to develop skills, to provide exercise, and to create interest in a form of recreation from which an individual can derive pleasure throughout his entire life. Swimming pools should be available to both elementary and secondary school pupils. Careful planning is required to obtain the best construction and intelligent programing to make the best use of available facilities.

Swimming pools may be indoors or outdoors; sometimes, in certain regions, an indoor pool may be opened up and converted into an outdoor pool during the summertime.

Many school swimming pools are made available for community use, a practice which is economical and fosters good school-community relations. Similarly, community swimming pools may be made available at times to school pupils. These cooperative arrangements desirably extend the use of facilities.

Regardless of the type of swimming pool that is available, or the place where it is located, attention needs to be given to sanitation and safety.

Swimming Pool Sanitation

If a pool has tile sides and bottom, if it slopes to a drain in the deep end, if adequate filtration and circulation are provided, and if a functioning chlorinator and pool vacuum are part of the pool equipment and are properly used, the bacterial count can be kept down and the clarity and safety of the water maintained. A minimum of eye irritation will occur.

The custodian and building engineer usually are responsible for cleaning the pool and operating the equipment that controls the quality of the water. Daily records should be kept of water and air temperature, residual chlorine, and hydrogen ion concentration. Satisfactory conditions are indicated by water temperature between 78° F. and 80° F. (with the air temperature 3 or 4 degrees higher); residual chlorine of 0.4 to 0.8 parts per million; and a hydrogen ion concentration of from 7.6 to 8.0; and total alkalinity at 50 ppm or slightly higher. Samples of water should be examined periodically, in accordance with health department regulations, to determine the bacterial count. Additional bacteriological examinations are recommended whenever there is any doubt about the maintenance of a desirable free-chlorine level.

Although chlorine is most commonly used to disinfect swimming pool water, bromine and iodine have sometimes been used in recent years for this purpose. Advantages for each of these agents have been claimed, but comparative studies to determine which is the most desirable disinfectant have not been conclusive. Accordingly, school officials are advised to consult with their community or state health department to determine locally recommended policies and practices.

Flooding the pool, that is, adding water to make the surface rise just above the overflow trough, will remove much of the hair, hair oil, and other floating debris. This should be done before the pool is first used each day.

Supervision and Education

A continuing problem centers around the supervision and education of pupils using the pool.[10] The following suggested regulations should be discussed with pupils and their cooperation secured in seeing that they are routinely followed. Similar regulations should be developed in each school having a pool, with the help of those who are to use it. Pupils should be informed of the reason for each regulation.

1. Everyone using the pool should have an overall bath, in the nude, with soap and water, washing carefully the armpits, the genital and rectal areas, and the feet.

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[10] American Public Health Association. *Recommended Practice for Design, Equipment and Operation of Swimming Pools and Other Bathing Places.* New York: the Association, 1957.

2. Before taking a shower, the bladder should be emptied. Pupils needing to urinate during the swimming period should be excused to go to the toilet.
3. Anyone leaving the pool to go to the toilet must take another cleansing bath with soap and water before returning.
4. Pupils should expectorate only in the overflow trough.
5. Boys and men should swim in the nude or wear sanitized trunks. Girls and women should wear sanitized tank suits.
6. Girls and boys with long hair should wear rubber bathing caps. Caps keep hair, dandruff, and hair oil from contaminating the water. They also keep hair out of the eyes.
7. Each pupil should be inspected by the instructor or the pool guard before he enters the pool. Pupils with evidence of skin infection, eye infection, respiratory disease, open cuts or sores, or bandages should be excluded.
8. There must be no rough or boisterous play and no running or playing tag in or around the pool area.
9. Pupils should wear ear plugs or nose clips if these have been recommended by their physicians. Some pupils, on medical recommendation, may need to be excused, at least temporarily, from participation in the aquatic program.
10. A qualified person, either the instructor or other person qualified as a lifeguard, should be on duty whenever the pool is in use. No pupil should enter the pool unless a guard is present. All doors leading to the pool should be locked when the pool is not in use and a guard not on duty.
11. Since dirt from shoes may be tracked into the pool and contaminate the water, spectators should be prohibited from entering the pool deck.

Pool regulations should be conspicuously displayed in the locker room, near the showers, and at several other places in the pool area.

Safety in swimming activities involves education, supervision, and equipment. A buoy or two, a life preserver, and one or two long poles or "shepherd's crooks" should be available in the pool at all times. These are needed to help a swimmer in distress before a serious accident occurs. Also, first aid equipment should be conveniently at hand.

With proper attention to sanitation and safety, a swimming pool provides opportunities for healthful, relaxing, and enjoyable activity. It develops interest in water sports and increases understanding of water safety. It can prevent accidents and save lives.

PREVENTION OF INFECTION

The spread of communicable disease occurs more readily among groups of young children than among adults. Schools should therefore be alert to their responsibility for preventing disease as well as promoting health. Close contact in physical education and athletic programs makes mandatory particular attention to environmental conditions related to such programs.

Tinea Pedis and Other Fungous Diseases

Commonly associated with swimming pools and locker rooms is the foot infection called "athlete's foot." This skin infection, caused by particular types of fungi, is known technically as epidermophytosis, dermatophytosis, or tinea pedis. The fungi are known as dermatophytes. Fungous infections cause cracking, blistering, weeping, and itching of the skin—symptoms that are annoying and painful. Since the condition may lead to serious secondary infections by bacteria, tinea pedis cannot be ignored. The disease can spread to other parts of the body and is sometimes found on the hands.

In an early study, it was found that exposing volunteers to foot baths contaminated with dermatophytes did not produce clinical infection. More recently, research workers have attempted to produce tinea pedis in more than 150 volunteers.[11] They found dermatophytes were often present on the skin for weeks, even months after exposure. However, those with foot trauma, such as blisters, were more likely to develop clinical infection than other persons.

Complete eradication of dermatophytes from locker, shower rooms, and swimming pool areas is impossible. Spores are long-lived and remain dormant for extended periods. Nevertheless, thorough daily washing of floors is recommended.[12]

Footbaths, in either shower rooms or swimming pools, are not recommended for preventive purposes. Though not necessarily responsible for spreading fungous infections, they quickly become dirty, insanitary, and unsightly. Because they promote a false sense of security and tend to lessen emphasis on proper personal care of the feet, they are considered detrimental rather than helpful.

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[11] Baer, Rudolph L., and Rosenthal, Stanley A. "The Biology of Fungous Infections of the Feet." *Journal of the American Medical Association* 197: 1017-20; September 19, 1966.

[12] Gip, *op. cit.*, p. 35.

Most important is preventive personal foot care. Students should be taught to—

1. Wash feet carefully with soap and water, particularly between the toes, after physical education and athletic activities.
2. Dry the skin thoroughly with special attention to the toes and areas between the toes. Remove dead or macerated skin.
3. Dust the feet with talcum powder or medicated powder.
4. Wear clean, dry socks and properly fitted, well-ventilated shoes.

Other fungous diseases associated with schools and physical education activities are tinea cruris, or "jockey itch," which appears in the groin; tinea dermis, ringworm of the skin; and tinea capitis, ringworm of the scalp.

Teachers should assist in the identification of students who have fungous skin disease. They may do this through observation and by being alert to students' complaints of itching and discomfort. Those with suspected fungous disease should be referred to their physician for treatment. Self-treatment is inadvisable and sometimes hazardous. Treatment of tinea pedis or other disease is not a function of school personnel.

Impetigo

This highly contagious skin infection is commonly found on the face and hands and is easily spread by scratching. It may be transmitted by direct contact or indirectly through towels, mats, and other recently soiled articles. Caused principally by staphylococci, prompt medical treatment is required. Sanitary supervision of school facilities, early recognition, and personal cleanliness are necessary to prevent its transmission. Infected persons should be excused from physical education and athletics while lesions are present.

Viral Skin Infections

Two other viral conditions that sometimes cause problems are plantar warts and herpes simplex. Plantar warts are usually found on the pressure-bearing parts of the foot. They may also appear on the hands. This viral infection apparently has a long and variable incubation period. It is associated with wet or damp environments and, as with tinea pedis, poor foot hygiene. Though considered a minor infection, plantar warts can be painful and require medical treatment.

Herpes simplex infection of the skin may occur in any pupil, but is particularly significant to wrestlers. It is estimated that well over 60 percent of the population carry herpes simplex virus. Initial inoculation and primary infection occurs through breaks in the skin and can be transmitted during body contact activities, such as occurs in wrestling.

Fever blisters or cold sores on the skin surrounding the lips are common signs of herpes infection. Lesions also appear on the eye, face, genital area, and elsewhere. Fever, chills, headache, and malaise may also be present, particularly with primary infections. Fatal complications are possible, but rare.[13]

Hygienic personal practices, clean physical education facilities, and referral of infected individuals to a physician are recommended for the prevention and control of herpes simplex.

Ear Infections

Otitis externa is a common infection among those who swim frequently during the hot summer months. Bacteria and fungi are found in the ear canal and are the probable cause of this painful condition. A physician can treat the disease and recommend preventive procedures to use routinely immediately after swimming.[14]

Communicable diseases are associated epidemiologically with a host, an environment, and agent factors. The school can do much to prevent disease and its spread by maintaining a clean environment. It must also supervise and educate all students in regard to healthful living and the prevention of disease.

Immunization

Many schools, according to law, require immunizations of new or beginning students. By active immunization, smallpox, diphtheria, pertussis (whooping cough), and tetanus (lockjaw) have for years been kept under control. In recent years, poliomyelitis immunization has been required, and more recently immunization against measles, German measles, and mumps has been made available.

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[13] Wheeler, Clayton E., Jr., and Cabaniss, W. Harvey, Jr. "Sports Contributions: Herpes Simplex in Wrestlers." *Journal of the American Medical Association* 194: 993-1002; November 29, 1965.

[14] Struhl, Theodore R. "Medical Supervision of an Aquatic Program." *Proceedings of the Sixth National Conference on the Medical Aspects of Sports.* Chicago: American Medical Association, November 29, 1964. p. 49.

A proper revaccination schedule should be maintained by everyone. Though such diseases as smallpox and diphtheria are now rare, they are a constant threat.

Tetanus immunization, or the lack of it, is a particular concern in physical education and athletics. The organism which causes tetanus is found everywhere but most often in dirt, where it survives for long periods of time. Animal excreta are largely responsible for the transmission of the tetanus organism to the dirt and fields. Individuals at play may become infected through accidental skin wounds.

Although only about 400 cases of tetanus occur each year, approximately 50 percent are fatal. Protection by immunization and periodic revaccination or booster shots is virtually 100 percent effective. Administrators, teachers, and coaches should actively encourage all students and school personnel to maintain their immunization schedules against all diseases for which such precaution is medically warranted.

A discussion of various types of immunization and suggested schedules for original and later reinforcing immunizations is contained in a statement developed under the auspices of the Committee on the Medical Aspects of Sports.[15]

HEALTH PRACTICES IN THE ATHLETIC ENVIRONMENT

As in physical education and intramural programs, the interscholastic athletic program should exemplify the highest possible standards for health, sanitation, and safety. Athletic activities are exposed to public view, and young people tend to emulate outstanding athletes. Consequently, athletic programs play an important role in health education by the examples they set.

Much of what is said of a healthful environment for physical education applies to athletics and vice versa. Interscholastic athletic programs are an extension of physical education and intramural programs. The interscholastic program provides the athletically talented or physically superior student an opportunity to exercise and develop his ability further with similar students from neighboring institutions.

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[15] Committee on the Medical Aspects of Sports. *Tips on Athletic Training—IX.* Chicago: American Medical Association, 1967. pp. 5-7.

Some Basic Principles

Interscholastic athletic programs have been studied carefully by professional leaders, resulting in the formulation of a series of principles. These state that the programs should be (a) regarded as integral parts of the total educational program and should be so conducted that they are worthy of such regard; (b) a supplement to, rather than a substitute for, basic physical education programs, physical recreation programs, and intramural athletic programs; (c) subject to the same administrative control as the total education program; (d) conducted by individuals with professional preparation in physical education; (e) so conducted that the physical welfare and safety of participants are protected and fostered; and (f) conducted in accordance with the letter and the spirit of the rules and regulations of appropriate conference, state, and national athletic associations.[16]

Medical Supervision in Athletics

A primary objective of athletic programs is to promote the health and well-being of the athlete-student. Adequate medical and dental examinations should be provided for all athletes at the beginning and as needed during each year of participation.[17]

The aims of the medical examination are to—

> Determine the health status of candidates prior to exposure to participation and competition;
>
> Provide appropriate medical advice to promote optimum health and fitness;
>
> Arrange for further evaluation and prompt treatment of remediable conditions;
>
> Counsel the atypical candidate as to the sports or modification of sports which for him would provide suitable activity;
>
> Restrict from participation those whose physical limitations present undue risk.[18]

Medical examinations are best administered by the athlete's personal physician. He is familiar with the student's background and medical history. The physician will interpret laboratory tests, arrange for immunizations, and recommend restrictions or disqualification, if necessary. Schools should provide a health examination form such as suggested by the National Federation of State High School Athletic Associations and the AMA Committee on Medical Aspects of Sports.[19]

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[16] American Association for Health, Physical Education, and Recreation. *Platform Statement of the Division of Men's Athletics.* Washington, D.C.: the Association, a department of the National Education Association, 1963.

[17] National Committee on School Health Policies of the National Education Association and the American Medical Association. *Suggested School Health Policies.* Fourth edition. Chicago: American Medical Association, 1966. p. 36.

[18] Committee on the Medical Aspects of Sports. *A Guide for Medical Evaluation of Candidates for School Sports.* Chicago: American Medical Association, 1965. p. 1.

There is need for increased communication between physician and school. "Physicians need to be fully informed about all aspects of the local physical education program."[20] This applies equally to athletic programs.

Planning for continuous medical supervision is best accomplished locally through cooperative consideration of available medical personnel and established school policies. If necessary, arrangements should provide for the school physician, team physician, or other medical service to administer the examination.

A physician should be present at all sports events in which contact or collision is inevitable and readily available during practice sessions. If possible, the physician should be one who has the opportunity to become familiar with the health history of each member of the team.

The physician's authority on medical matters and the health factors in athletic programs should be unquestioned. Decisions involving potentially serious injury, such as whether to move an injured athlete or to return him to play and whether to cancel a game due to excessive heat, are medical decisions. The coach and the school administrator should be pleased to have these decisions made by a properly qualified person. By their example, they discourage self-diagnosis of medical problems and self-medication.

The Coach and His Responsibilities

Various aspects of the athletic program are related to the health of the athlete. Responsibility for the administration of the program and conduct of supervisory personnel, athletes, and spectators belongs to the school administrator. However, the coach of the team is always directly involved. In addition, there are procedures which safeguard the health of athletes for which he has primary responsibility.

In addition to his skill in coaching a particular sport and cooperating with the team physician, the coach should be well-qualified in understanding the principles of growth and development, exercise, physiology, the basic concepts of physical education, and first aid.

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[19] *Ibid.*, pp. 2-3.

[20] Committee on Exercise and Physical Fitness, *op. cit.*, p. 267.

The coach should work to allow and encourage (a) only one sport in one season for an athlete; (b) appropriate preseason conditioning and training in fundamentals before any competition; (c) playing schedules of reasonable frequency and seasons of reasonable length; (d) matching teams and individuals of comparable ability, size, age, and maturity; (e) continuing education and advancement of programs in the prevention of sports injuries; and (f) sportsmanlike behavior by athletes and spectators.

The last item is a mental health dimension which includes more than good sportsmanship. The behavior of participants and spectators at athletic competitions is frequently most affected by the attitude and behavior of the coach.[21] In turn, the school administrator must accept responsibility for the behavior of his coach as well as the student body.

To do his job well the coach must see that a myriad of details concerning health and safety, some easily overlooked, are taken care of. Mouth protectors and equipment for contact sports must be properly fitted and used. Clean towels and hygienically dispensed drinking water must be provided. Equipment and athletic clothing must be cleaned and in good repair. Injuries must be cared for properly, and only healthful practices developed and followed.

The coach needs to be aware of health education implications in the health practices of athletes under his supervision, for these practices may be accepted as models by the entire student body.

Some specific learning experiences are described in the following statement:

> What could be better health education than for the rest of the students to witness members of the team using their own marked towels during time-outs, or wearing only scrupulously clean socks and other personal equipment, or using individual paper drinking cups during rest periods when a drinking fountain is not available? Think, too, of the influence athletes might have through example by remaining out of school when ill, by receiving proper first aid for injuries, and by seeking medical attention promptly, when it is needed.[22]

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[21] Kleinman, Seymour. "A Study To Determine the Factors That Influence the Behavior of Sports Crowds." Unpublished dissertation. Columbus: Ohio State University, 1960. See also Hixson, Chalmer G. *The Administration of Interscholastic Athletics.* New York: J. Lowell Pratt and Co., 1967. pp. 133-34, 140-41.

[22] Committee on Medical Aspects of Sports. *Tips on Athletic Training—III.* Chicago: American Medical Association, 1961. p. 11.

Full realization of the abundant potentialities in athletics for effective health education helps to vitalize the entire health teaching program.

The athlete has a responsibility for setting the right example in sportsmanship, citizenship, and health. Exposed to an athletic environment conducive to healthful practices, he should enjoy his good fortune and respond by following the recommendations of the coach and team physician. He should avoid dangerous, unhealthful practices and unsportsmanlike means for attaining success.

Some Specific Health Problems

From the myriad health problems which may occur among boys and girls a few specific ones have been selected for discussion here because of the coach's responsibilities in relation to them.

Cigarette smoking is a health hazard. It is significantly associated with increased morbidity—with lung cancer, heart disease, chronic bronchitis, and emphysema. Also, there is evidence that smoking has a temporarily adverse effect on pulmonary function and thus impairs athletic performance.[23] The coach should, by example and by authority, discourage youngsters and others from smoking, not only in and around schools but away from school.

The use of drugs and stimulants in an attempt to improve performance is frequently hazardous, usually unsuccessful, and always poor sportsmanship. The coach should never promote or condone the use of drugs and stimulants except for medical purposes as prescribed by a physician.

Heat exhaustion and heat stroke are hazards of sports during the hot summer months. Preseason conditioning for football during August deserves particular attention. Fatalities began to occur in the late 1950's, probably as a result of the increased use of air conditioning in buildings, homes, and automobiles. When the unconditioned, unacclimatized athlete attempts vigorous activity in hot humid weather while wearing a heavy uniform, his body develops an unusually high temperature. Unable to evaporate sweat and radiate heat, he is apt to develop heat stroke. This is characterized by the cessation of sweating.

Heat cramps or, more serious, heat exhaustion occur with prolonged vigorous activity and loss of water and salt during heat exposure. These sometimes precede heat stroke. Unconsciousness may occur in both heat exhaustion and heat stroke.

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[23] Committee on the Medical Aspects of Sports. *Tips on Athletic Training—IX*. Chicago: American Medical Association, 1967.

To prevent environmental heat illness, the coach should—

1. Require a careful medical history and checkup prior to the beginning of practice.
2. Schedule workouts during cooler morning and early evening hours in hot weather.
3. Acclimate athletes to hot weather activity by carefully graduated practice schedules.
4. Provide rest periods of 15 to 30 minutes during workout of an hour or more in hot weather.
5. Supply clothing that is white to reflect heat; brief, loose, and comfortable to permit heat escape; and permeable to moisture to allow heat loss via sweat.
6. Furnish extra salt and water in recommended amounts during hot weather.[24]
7. Watch athletes carefully for signs of trouble, particularly the determined athlete who may not report discomfort.
8. Remember that temperature and humidity, not the sun, are the crucial factors. Measuring the relative humidity by use of a sling psychrometer on the field is advantageous in this regard. Heat exhaustion and heat stroke can occur in the shade.
9. Know what to do in case of such an emergency; this entails immediate first aid and prearranged procedures for obtaining medical care.[25]

Weight reduction by crash diets or by the use of the "sweat box" or rubber suits should be forbidden by the coach. There are serious health hazards for some individuals who undergo crash diets and high levels of exertion, such as do wrestlers. The loss of weight by sweating is largely a loss of water and salt. As a result of the dehydration, and in some cases starvation, there is likely to be a decrease in endurance, speed, and hand-eye coordination. Serious complications are possible. Neither a rubber suit nor a "sweat box" has any place in the athletic environment.

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[24] There is no basis in scientific fact for the theory that athletes should not have water during workouts. If additional salt in the diet does not suffice, and since salt tablets are poorly absorbed and tend to be nauseating, adding a tablespoon of salt to six quarts of flavored water is a suitable mixture.

[25] Committee on the Medical Aspects of Sports. *Tips on Athletic Training—VIII.* Chicago: American Medical Association, 1966. p. 7.

Nutrition for the athlete follows the same general principles of good nutrition for everyone. There are no "special foods" to endow the athlete with improved performance. Though athletes need a high caloric intake due to high activity levels, the old adage "a varied diet tends to be a balanced diet" still applies. Perhaps the only innovation in recent years is in regard to pregame nutrition. The belief that a high-protein diet a few hours before competition is beneficial to performance is an erroneous one. The value of such meals is primarily psychological. High-carbohydrate meals prior to a contest are more likely to provide readily available fuel for energy.[26]

Since what the coach recommends as a diet for young athletes is frequently interpreted as desirable for all students, he must follow sound nutrition principles.

Junior High School Athletics

Interscholastic athletic programs for junior high school students are numerous, despite controversy over their values and hazards. Physicians, educators, and parents are concerned about possible injury to developing bodies, emotional stress, and undue physical and social pressures. However, convincing evidence of effects is not yet available, and practices must be based on the opinions of professional leaders in physical education, athletics, and medicine.

Perhaps the greatest hazards are poorly organized, improperly supervised, unmatched (by age, size, and strength), overscheduled, and overemphasized athletic programs. The American Association for Health, Physical Education, and Recreation, in consultation with medical and school health groups, has developed standards as safeguards for the athletically talented young. A recent report of the Association states that the interscholastic athletic program for boys in the junior high school—

> Should make definite contributions toward the accomplishment of the educational objectives of the school;
>
> Should supplement, rather than serve as a substitute for an adequate program of required physical education, intramurals and physical recreation for all students;
>
> Should, under the administration and the supervision of the appropriate school officials, be conducted by men with adequate professional preparation in physical education;

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[26] Mayer, Jean; Bullen, Beverly; and Pollack, Herbert. "Nutrition for the Athlete." *AMA Proceedings of the Second National Conference on Medical Aspects of Sports.* Chicago: American Medical Association, 1961. pp. 51-52.

Should be so conducted that the physical welfare of participants is protected and fostered.[27]

Safeguarding the Health of the Athlete

The school—its environment, programs, personnel, and students—can protect and promote health. To help evaluate major areas of healthful athletics for boys and girls, the following checklist is offered:

Proper conditioning helps to prevent injuries and to increase resistance to fatigue.

1. Are prospective players given directions and activities for preseason conditioning?
2. Is there a minimum of three weeks of practice before the first game or contest?
3. Are precautions taken to prevent heat exhaustion and heat stroke?
4. Is each player required to warm up thoroughly prior to participation?
5. Are substitutions made without hesitation when players evidence disability?

Careful coaching leads to skillful performance, which lowers the incidence of injuries.

1. Is emphasis given to safety in teaching techniques and elements of play?
2. Are injuries analyzed to determine causes and to suggest preventive programs?
3. Are tactics discouraged that may increase the hazards and thus the incidence of injuries?
4. Are practice periods carefully planned and of reasonable duration?

Good officiating promotes enjoyment of the game and the protection of players.

1. Are players as well as coaches thoroughly schooled in the rules of the game?
2. Are rules and regulations strictly enforced in practice periods as well as in games?

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[27] Junior High School Athletics Sub-Committee of the Joint Committee on Standards for Interscholastic Athletics. *Standards for Junior High School Athletics.* Washington, D.C.: American Association for Health, Physical Education, and Recreation, a department of the National Education Association, 1963. p. 20.

3. Are officials qualified both emotionally and technically for their responsibilities?
4. Do players and coaches respect the decisions of officials?

Right equipment and facilities serve a unique purpose in protection of players.

1. Is the best protective equipment provided for contact sports?
2. Is careful attention given to proper fitting and adjustment of equipment?
3. Is equipment properly maintained, and are worn and outmoded items discarded?
4. Are proper areas of play provided and carefully maintained?
5. Are pupils instructed in proper use of equipment?

Adequate medical care is a necessity in the prevention and control of injuries.

1. Is there a thorough preseason health history and medical examination?
2. Is a physician present at contests and readily available during practice sessions?
3. Does the physician make the decision as to whether an athlete should return to play following injury during games?
4. Is authority from a physician required before an athlete can return to practice after being out of play because of a disabling injury?
5. Is the care given athletes by coach or trainer limited to first aid and medically prescribed services? [28]

FOR FURTHER READING

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AMERICAN ASSOCIATION FOR HEALTH, PHYSICAL EDUCATION, AND RECREATION. *Standards for Junior High School Athletics.* Washington, D.C.: the Association, a department of the National Education Association, 1963.

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[28] Committee on Medical Aspects of Sports. *Safeguarding the Health of the Athlete.* Chicago: American Medical Association, 1966. p. 23. See also National Education Association and the American Medical Association, Joint Committee on Health Problems in Education. *School Health Services.* Second edition. Washington, D.C., and Chicago: the Associations, 1964. pp. 276-77.

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Chapter 13

The School Administrator and the Environment

The school administrator, whether principal of a small rural school or superintendent of a large metropolitan system, is a central figure in helping to achieve a successful school health program. In addition to his role in health education and health services, the administrator's responsibilities include the supervision of those procedures that assure a healthful environment for pupils and school employees. The administrator's knowledge, interest, cooperation, inspiration, and active participation do much to bring about conditions that favor pupil health, growth, and learning. His concern for environmental factors, stated so clearly that it becomes manifest to all staff members, is an important factor in determining the completeness and effectiveness of measures designed to obtain or maintain healthful environmental conditions.

The material in this chapter suggests ways in which superintendents and principals can help develop and strengthen procedures and practices related to the environment. Attention is focused on such administrative matters as policies, budgetary needs, personnel requirements, and health of the school staff. Emphasis is placed on the role of the administrator in developing teamwork among staff members and between them and those community groups which have an interest in the effect of environment on the health of pupils. Wise administration improves the school environment, thus protecting the health of pupils and teachers and facilitating pupils' attainment of educational goals.

ADMINISTRATIVE LEADERSHIP

As a leader in education the school administrator sets the stage for an effective program through procedures that provide the school system with policies and personnel that make healthful school living possible. He influences the lives of pupils and school personnel by the methods he uses. He recognizes the many aspects of the environment that affect the well-being of pupils and makes every effort to assure that these factors are favorable.

The Physical Environment

The administrator has the responsibility for seeing that physical conditions are provided which protect the health of pupils and which, in a real sense, help to determine educational outcomes. This responsibility extends all the way from the selection of a school site and the construction of a school building to appropriate attention to safety, lighting, heating, ventilation, acoustics, housekeeping practices, water supply, waste disposal, and food services. Pupils cannot achieve their full educational potential unless every aspect of the physical environment is so controlled that it contributes to their comfort and total health. The close relationship between the school physical plant and the health and learning ability of its occupants is now more widely recognized than ever before.

Emotional and Social Factors

To bring children and youth up to the highest level of their learning potential, attention must be given to numerous factors in school organization that affect the health of pupils. Among these are the length of the school day and the school year, size of classes, pupil groupings, schedules, recess and lunch periods, homework assignments, pressures and tensions, and other considerations.

The very presence of a pupil at school may produce problems which have a bearing on his health. First of all he has the task of learning to live in physical surroundings which are often quite different from those to which he is accustomed at home. He must learn to live under the supervision of someone other than his parents. His contacts with other pupils sometimes have undesirable aspects. There may be subtle or obvious problems of relationships with classmates and teachers. School programs which rate academic achievement alone above well-rounded development may affect health. These are illustrative of the many and diverse factors which comprise a school environment. The alert administrator will be aware of these and utilize every possible opportunity to avoid unhealthful influences.

The superintendent can promote psychologically healthful school conditions by providing an environment conducive to the emotional well-being of teachers. Rapport between an administrator and his staff is as essential for a smooth-working school program as is rapport between teachers and pupils. The superintendent by his own actions and by his counseling can influence the attitudes and methods of principals and other members of the administrative staff and thus help to develop friendly, satisfying relationships. He can be helpful and constructive in his direct contacts with teachers and other school employees and establish policies which give teachers a sense of self-confidence and security. The successful school superintendent selects his staff with care and then "gives them enough rope to hang themselves, but holds on to the end of it to see that they don't do it." Qualified, well-adjusted, healthy staff members, secure in their responsibilities, form the foundation for an emotionally healthful environment.

Characteristics of Good Leadership

Administrative practices that assure a healthful school environment are consonant with those that promote effective and efficient instructional programs. The administrator most likely to be successful in providing leadership is one who, with respect to health—

1. Combines in his own life good physical health with wholesome mental, social, emotional, and spiritual qualities.
2. Delegates responsibility to staff members, creates a feeling of security among school employees, and cooperates with staff personnel in determining policies governing all phases of the health program.
3. Shows appropriate respect for all people with whom he associates. There are many thorny problems in school administration, and the health program provides its share. The good administrator uses tact and skill in helping members of his staff see that there is more than one side to most problems.
4. Is considerate of his colleagues. He is conscious of health to the extent that he will not formulate or approve policies or directives which injure or work a hardship on members of his staff.

The administrator is controlled by the objectives of his office and by the interests and desires of the community he serves. The closer he relates himself to these interests and desires, the more secure will be the school health program.

BASIC POLICIES ARE ESSENTIAL

The school superintendent promotes the maintenance or development of a healthful school environment through proposing to his board of education basic policies relating to environmental conditions. His proposals will be accompanied by information that helps board members to understand their importance to the health of pupils and their ability to learn. A declaration by the board of education that a prime objective of the school is to provide a pleasant, safe, sanitary, and cheerful environment for all pupils can strengthen awareness of this need and is essential to the attainment of such a goal.

In a similar manner, the principal of a school can, and should, make clear to all who work with him that he considers the creation of a healthful environment an important task shared by everyone. He should point out various aspects of the school environment and emphasize the attention that each requires. Leadership of this kind is essential if the school staff is to contribute wholeheartedly to the development of a favorable environment.

Inspection of the Physical Environment

Systematic inspections of the physical environment should supplement day-by-day observations by principals, teachers, and custodians. These inspections should include every part of the school building and grounds and should be concerned with the adequacy of sanitary facilities, the effectiveness of housekeeping procedures, and the presence or absence of accident hazards. Reports of all inspections should be submitted to the superintendent and principal, and the board of education should be informed of needed action to correct unsafe and unhealthful conditions.

Sometimes inspections are made for limited purposes: to identify fire hazards, to evaluate lighting conditions, or to check lunchroom sanitation. Such inspections aid in directing attention to a particular phase of the environment and facilitate the use of individuals with training and competence in a special field. For example, a sanitarian from the health department can check the adequacy and condition of toilets, washing facilities, and other sanitary features; while a fire inspector can inspect for fire hazards, a safety engineer for accident hazards.

The role of the administrator is to see that inspections are scheduled to cover all aspects of safety and sanitation and to make sure that action is taken in accord with needs revealed by the inspections.

Sometimes inspections of sanitary and safety conditions are made by a group. The principal, the custodian, and a person with special competence in safety and sanitation are always members of the inspecting group. Others may be members of the school health staff, a parent or two, a classroom teacher, and several pupils. All these persons can benefit from first-hand observation of school conditions.

Evaluating the Emotional and Social Environment

Administrative leadership is important in improving a school's emotional and social environment, but for this purpose the administrator will use different techniques and have different allies. The administrator may utilize various methods for increasing staff members' awareness of the effect of school and classroom procedures on the emotional health of pupils. He may encourage teachers to enroll in university courses relating to emotional health and the growth and developmental characteristics of children or provide for such courses to be given locally. Special courses in the care of the handicapped, problems of delinquency, education of retarded children, and the school health program may be included. Fees for such courses, in whole or in part, may be paid by the board of education, or credits toward salary advancements may be given.

His allies, in addition to members of the school health staff, will depend on the types of persons available. Ideally, the curriculum director, a psychologist, a social worker or guidance teacher, and other persons with particular interest in mental health will assist the superintendent, principal, and teachers in analyzing the emotional and social climate of the school and in identifying areas that need improvement.

The approach to the evaluation of pupils' emotional and social environment can be along several paths. Teachers may be encouraged to become acquainted with the home and community lives of their pupils, including attention to educational, economic, religious, and ethnic factors. Teachers may also study the communities that their school serves and become acquainted with projects that have been undertaken, or are planned, to improve the community. Such study will undoubtedly uncover ways in which the school may help to further community projects.

Staff meetings of the school system or of a single school may desirably be devoted, at times, to discussions of the effect on pupils' mental health of such matters as marking and grading procedures, promotional policies, grouping arrangements, and attitudes toward misbehavior and delinquency.

Parents and pupils should be encouraged to participate in discussions of the influence of school procedures on pupil health. Their views, whether in agreement or at variance with those of staff members, may be revealing and stimulating. Meetings of this nature afford opportunities for consideration of parents' roles in the care and supervision of children and youth and the need for parents and teachers to work cooperatively.

Evaluation of the emotional and social environment of the school requires careful assessment of the effect on pupils of a multitude of school situations and procedures. It is a difficult task, complex in nature and broad in scope. However, such efforts bring great satisfaction to administrators and teachers and often lead to major improvements in school policies.

Budget Requirements

All school programs require money, and that for providing a healthful school environment is no exception. The board of education has responsibility for adopting budgets and for seeing that necessary funds for providing healthful schools and grounds are made available. The school administrator, however, is responsible for interpreting to the board the needs that must be met and the amount of money required to meet them.

Only by appropriating adequate amounts of money can a board of education meet its obligations to provide safe, wholesome, sanitary school buildings. Money may be needed for construction or equipment. It may be needed for personnel to deal with the emotional and social aspects of the school environment or to improve school housekeeping. Adequate supplies of such items as soap, towels, toilet tissue, cleaning materials, and light bulbs can be made available only if funds are in the budget for their purchase. The best of policies is of no value unless it is implemented.

PERSONNEL REQUIREMENTS

The success of administrative measures in obtaining qualified personnel and in providing leadership and coordination for their efforts is a prime factor in determining the type of school environment to which children and youth will be exposed.

Physicians, nurses, and health educators serving the school consider the development and maintenance of a healthful school environment an important area of their responsibilities. At the same time, they recognize that the provision of a total environment favorable to pupil growth and health requires the active participation of many other persons. It involves the organizational pattern of the school and daily classroom procedures. It includes the work of psychologists, social workers, and guidance personnel, all of whom may be engaged in helping pupils with emotional and social problems or in working to prevent such problems. It is the concern of the food service and the custodial and maintenance staffs. Truly, everyone connected with the schools needs to participate in the creation of a desirable environment for children and youth.

Among the most important functions of a school administrator are assignment of responsibility for providing leadership for the total school health program and ensuring that each member of the school staff understands his own role in relation to environmental conditions and appreciates the roles of other staff members.

Leadership for the School Health Program

The school administrator is a busy man. For example, he must deal with problems of buildings, budgets, public relations, hardware and software, technology, urbanization, local-state-federal relationships, teacher and labor organizations, integration, church-state relationships, and evaluation, as well as the instructional program. Obviously, he cannot be expert in all subjects and in all areas. He, therefore, selects competent people to assist him.

In all but the smallest school systems, one of the most important administrative tasks of the superintendent related to the school health program is to recommend to his board the appointment of a person to give leadership to that program. Someone professionally prepared in school health can provide expert guidance in the development and evaluation of the school health program. This person may be an assistant superintendent of schools, a director of school health, or a school health coordinator. His exact title is unimportant, but his functions are essential to the successful conduct of a school health program.

The coordinator of school health, regardless of his title, is concerned with all divisions of the school health program: health education, health services, and the provision of a healthful environment. Consequently, he should be a person with a primary interest in health and a background of professional preparation and experience in both health and education. He will deal with matters of policy, budget, staff qualifications, staff in-service education, and program evaluation. He will be active in coordinating school health efforts with those of the local health department, local medical and dental organizations, and voluntary health agencies.

The school health coordinator has another important responsibility. He surveys and evaluates the health needs of the school system and keeps the superintendent of schools informed regarding trends, the need for facilities and equipment, and the need for funds.

As the superintendent delegates to one person responsibility for providing leadership for the school health program of a system or district, so should the principal appoint one person to give leadership to health activities in his school. Even though this may be a part-time responsibility in a small school, it can increase the effectiveness of all parts of the school health program.

In selecting and appointing a leader for this program, the administrator should be conscious of the distinction between school health and school physical education programs. Each of these areas makes a unique contribution to education, but they have different purposes, use different procedures, require different facilities, and often involve different personnel. These differences need to be kept in mind, even when both programs are administered in a single department. To submerge one field in the other is to reduce seriously the effectiveness of both.

Role of Various Staff Members

As leader of a team representing various professional disciplines, the school health coordinator or the superintendent in a small school system has the important task of helping each person understand the way his particular work affects the school environment and the way it relates to the work of others. Careful delineation of responsibility is essential to the development of effective teamwork.

Determination of the responsibilities of various staff members can best be achieved through joint meetings of those concerned with a particular task. Such meetings may be held on a systemwide or individual-school basis. In the latter instance, the principal acts to unite his co-workers into a team. In one school, for example, the principal chaired a staff meeting attended by teachers, the school medical adviser, the nurse serving the school, the health educator, the custodian, and the food service director. The purpose of the meeting was to determine what could be done to improve classroom lighting. During the discussion, the physician and nurse presented information concerning lighting standards. Teachers agreed to involve students in a study of variations in illumination in different parts of classrooms on clear and on cloudy days. The custodian described the schedule for window washing, offered suggestions about using shades, and urged teachers to inform him of burned-out bulbs. He agreed to trim shrubbery that was keeping light out of several rooms. The food service director asked the principal to have the lunch room painted a lighter color to increase reflected light. Everyone became conscious of light needs and worked to secure the best possible conditions. Each person knew his specific responsibility.

HEALTH OF THE SCHOOL STAFF

Part of the school environment of pupils consists of the human beings who make up the school staff, and, from the point of view of health, these persons exert an influence that is at least as important as that produced by the physical environment. Consequently, measures to protect, maintain, or improve the health of school employees help to produce a favorable school environment. These measures, developed cooperatively by the school administrator, representatives of school employees, and representatives of the health professions, include periodic medical examinations, provision of appropriate sick leave, and arrangements for group health and hospitalization insurance.[1]

The health of school personnel is protected and maintained partly by providing healthful working conditions. Administrators are rightly concerned with the teaching or working load of staff members. Teachers should gain satisfaction from their work, feel that they have a significant job to do, and receive commendation for unusual or exceptional achievements and contributions. In a similar manner, other employees must be so treated that they maintain their self-respect, gain pleasure from doing a necessary job, and feel at ease while working with their colleagues.

Periodic Medical Examinations

A first step in promoting staff health is to require pre-employment examinations for all prospective school employees. The examination should include a chest x-ray.

Periodic medical examinations during the years of employment are a means of safeguarding health and of facilitating the identification of disease or other handicapping conditions. Many schools require such examinations at intervals of from one to five years. The employee may go to his own physician or may be examined by a physician employed by the board of education. In the former instance the employee personally pays for his examination, whereas in the latter procedure the cost is ordinarily borne by the board of education. Regardless of whether periodic examinations are required, employees should be encouraged to consult their own physicians regularly and whenever they are in need of counsel or advice regarding their health.

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[1] National Education Association and the American Medical Association, Joint Committee on Health Problems in Education. *Health of School Personnel.* Washington, D.C., and Chicago: the Associations, 1964.

The procedures outlined in the school code of the St. Paul, Minnesota, public schools illustrate a good practice. All employees are required to have a pre-employment health examination. After employment, health examinations are required every three years for teachers and other school personnel who come into direct contact with pupils on a daily basis. School employees who handle food are required to have yearly health examinations. A teacher who has been absent from duty because of illness for a period of four weeks or more or who has suffered a serious accident must submit a health report from an examining physician before reporting for service. The superintendent of schools may require any employee of the St. Paul schools to submit a health report should it appear to be in the best interest of the schools. The report of the examining physician of the teacher's own choosing is made on a form provided by the board of education. A reply to all items listed therein is required. The physician's fee for such a required report is paid by the board of education.

Sick Leave and Other Leaves of Absence

One of the ways in which the school administrator can promote the health of his staff is to work out with them and the board of education a liberal sick leave policy. Such a policy, in addition to being humanitarian for the individuals involved, has as its primary justification the protection and benefits that accrue to pupils. Without sick leave provisions classroom teachers and other employees who cannot afford to lose a day's pay may remain in school in direct contact with pupils when they are suffering from illness. Furthermore, a teacher who is ill cannot do a good job of teaching, and, if the illness is contagious, it is a direct hazard to the health of pupils. Sick leave plans are almost universal in public school systems today.

Medical examinations before school employees return to work after being ill for a substantial period of time or having sustained a serious accident are a safeguard to both pupils and teachers. They provide assurance that the individual is fit to teach and ready to return to work.

To permit a teacher to take a leave-of-absence for a semester or a year frequently will enable him to improve his health and thereby his efficiency as a staff member. Sometimes no pay is allowed for such a leave-of-absence. However, some school systems establish policies which provide for extended leave in certain cases with partial payment of salary.

Insurance for Staff Members

Another responsibility of the administrator and his school board is the establishment of a group health and hospitalization insurance plan which is available to teachers and other school employees. Current practice is that payment for such health protection is shared by the board of education and the teacher. In some instances, however, boards of education pay the entire cost of group health and hospitalization insurance. Many boards of education have arrangements that make it possible for an employee to buy life insurance for the members of his family at low cost.

COORDINATION WITH COMMUNITY HEALTH RESOURCES

No school system is in a position to implement a sound health program alone. In the broad field of health, the need constantly arises for assistance, up-to-date information, and guidance from experts. Considering the magnitude and diversity of health needs, it is indeed fortunate that many people and groups in addition to schools work to protect and promote health. Public health officers, private physicians and dentists, nurses, social and welfare workers and their respective professional and official organizations, as well as voluntary health agencies, are all concerned with health activities in the community. The school administrator who successfully coordinates the health activities of his staff with community health efforts has fulfilled one of his most important responsibilities and set the stage for rewarding accomplishments.[2]

Advisory School Health Councils

One effective medium for coordinating community health resources with the school health program is the advisory school health council, which can serve the school administrator and the health staff as a planning, problem-solving, and coordinating body. Advisory school health councils fall into two general categories:

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[2] American Association for Health, Physical Education, and Recreation. *Teamwork in School Health.* Report of the National Conference on Coordination of the School Health Program. Washington, D.C.: the Association, a department of the National Education Association, 1962.

1. The communitywide health council, which usually includes representation from schools, from parents, and from various community agencies and organizations. Such a council considers community problems and methods for solving them, including school health programs and problems.
2. The individual school council or committee, which may be composed of persons connected with the health program in a particular school—the principal, one or more teachers, a medical adviser, the school nurse, the health educator, parents, and others, such as a dentist, the cafeteria manager, the custodian. Pupils may be represented on the school health committee, or there may be a separate pupil health committee.

In some school systems, a coordinating council of representatives of individual school councils may be helpful. Health problems common to all schools can be analyzed and frequently solved by sharing ideas, time, and effort. An example of such a council is the Tulare County (California) School Health Advisory Board. This council has worked since 1957 to coordinate the health programs in 116 public schools and to improve the effectiveness of each.

The communitywide health council provides an opportunity to bring together representatives of parents, teachers, school administrators, the health department, the medical and dental professions, and the voluntary health and social agencies. It provides a suitable means for developing community understanding of school health procedures and for devising effective measures for improving the health of children and youth. The council serves in an advisory capacity to the school staff and school administrators; its function is to suggest policies rather than to make them.

The composition and function of a community health advisory council as suggested by the National Committee on School Health Policies is worthy of consideration:

1. The purposes, objectives, and policies of the council should be stated clearly and reviewed periodically.
2. The council should include representation from the school administration; parents; the school staff; the health department; medical, dental, and nursing societies; and community agencies with programs related to personal and community health. The organization should remain flexible.

3. Each group should be given an opportunity to select its own representatives. Officers should be elected by the council for a specified term.
4. The council should meet regularly with a prepared agenda.
5. Each group should be permitted to present any health problem of schoolchildren for council consideration. Particular attention should be given to problems requiring joint action by the schools and other community agencies and those that involve participation by two or more professional groups.
6. Use should be made of subcommittees, but these should relate in function to the council as a whole.
7. Although long-term projects are necessary and appropriate, projects which can be completed successfully in a short period of time should not be neglected.
8. Publicity should be given throughout the community to the council's progress and accomplishments.
9. Emphasis should be placed on solving pertinent problems, such as developing written emergency procedures, rather than on organization or on routine procedures.
10. All members of the council should be involved in planning, recommending, and evaluating programs.[3]

Governmental Agencies and Professional Associations

The school administrator can get considerable help from local governmental agencies. The health department can suggest desirable standards for sanitary facilities and provide up-to-date information on such matters as proper safeguards in food handling and proper measures for controlling the safety of swimming pool water. Both fire departments and police departments are qualified to offer suggestions regarding safety measures. Welfare agencies can give schools information about the home backgrounds of particular pupils and also let schools know how their clients feel about the effects of school procedures on pupils.

Such professional organizations as the local medical and dental societies can be counted on to support efforts to improve the environment of schools. These organizations are concerned with all matters affecting the health of children and youth, and many have school health committees. They usually have representatives on the school health council. At national, state, and local levels, physicians have organized school health conferences, some of which have been devoted to school environmental conditions. The wise administrator will make full use of the resources afforded by medical and dental associations.

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[3] National Education Association and American Medical Association, Joint Committee on Health Problems in Education. *Suggested School Health Policies.* Fourth edition. Washington, D.C., and Chicago: the Associations, 1966. p. xi.

Working with Voluntary Health Agencies

The contributions of voluntary health agencies to school health programs are commendable. The school administrator who works cooperatively with the voluntary health agencies will find that they are a source of strong support and may provide resources that aid in the extension and improvement of the school health program. A committee of educators and representatives of voluntary health agencies prepared a report on interrelationships between the schools and the agencies and set up the following guidelines:

1. Recognition of common goals is essential.
2. Mutual understanding of purposes and procedures is necessary.
3. Mutual projects are best when planned and undertaken jointly.
4. New health activities should be an integral part of the school health education program.[4]

Both schools and health agencies are concerned with community life, community health, and community standards of living. Working together they can accomplish much which is good for the children and youth of the community. Such agencies, when kept informed by the school administrator with regard to the nature of his program, can be excellent interpreters of the school health program and can cooperate in developing a foundation for coordinated attacks on health problems.

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[4] American Association for Health, Physical Education, and Recreation. "Guidelines for Effective Health Planning by Schools and Voluntary Health Agencies." *Journal of Health, Physical Education, and Recreation* 34: 26-27; September 1963.

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Chapter **14**

Utilizing the Environment for Health Education

Health education involves the provision of experiences that contribute to pupils' practices, attitudes, and knowledge relative to health. The goals of health education are achieved only through the application of health principles to daily living; to know is important, but to take positive action is essential. A unique opportunity exists to influence pupils' health practices through their experiences in living at school. These experiences may be used to motivate the development of healthful practices in home and community life.

Classroom and school environments influence health attitudes and behavior, either favorably or otherwise. Sometimes these influences are subtle in their effect on attitudes and behavior; at other times they are more direct. The effective use of the health education opportunities provided by the school environment is a real and continuing challenge to teachers.

This chapter highlights some of the opportunities for health education which are related to environmental conditions and to the experiences of living at school. Little attempt is made to organize these suggestions on appropriate grade levels. It is the individual teacher's responsibility to utilize the suggested teaching opportunities as they are appropriate to the maturity of his pupils and as they meet pupils' health needs and interests.

LEARNING TO LIVE HEALTHFULLY AT SCHOOL

Situations frequently arise within the school or within the classroom that have significant potential for health education. Opportunities for such situational or incidental instruction extend throughout the school day and the school year.

Getting Acquainted with the School

When children enter kindergarten or first grade, the school building and grounds are an unfamiliar and complex new world. New behavior patterns have to be learned, and puzzling adjustments made. Learning how to use toilets, handwashing facilities, and drinking fountains properly requires instruction and supervision. Lunchroom and playground behavior which is healthful, safe, and socially acceptable needs to be established. Attention to safety factors involved in bus transportation and pedestrian behavior is imperative. The teacher of newcomers to school will, of necessity, help pupils understand and practice health and safety skills in the use of the school environment. Helping children to live healthfully constitutes a major goal of health education in the primary grades.

Tours of the building and grounds may be early steps in this orientation process. Children will feel more secure and sure of themselves if the teacher takes them around the school and introduces them not only to the physical facilities of buildings and grounds, but also to the people who are new to them, such as the principal, nurse, lunchroom manager, and custodian. During a tour the teacher and pupils can discuss how to use the drinking fountains, toilets, urinals, and washing facilities. Playground apparatus can be observed and demonstrations conducted concerning the proper use of slides, jungle gyms, "tricky" bars, and other equipment.

Observation of and acquaintance with the environment is a first step in the development of the skills, attitudes, and understandings necessary for safe and healthful living at school. Supervision of pupils and the provision of help in the development of acceptable behavior patterns should be continued for as long as needed.

The Classroom Environment

Management of the classroom environment is a joint responsibility of the maintenance staff, teachers, and pupils. Movable school furniture has replaced the old stationary rows of seats and desks. The arrangement of seating can now be varied in accord with the variety of activities which occur in the classroom. There may be a tendency to move seats around with little regard for advantageous lighting or good hearing, unless the teacher is sensitive to these factors. Even though seats are movable, they should be assigned to individual boys and girls on the basis of size, to ensure comfort and good body position. Pupils can discuss good seating and become conscious of its relationships to comfort and to the prevention of fatigue.

Management of classroom lighting, temperature, ventilation, and noise can become a shared responsibility of teachers and pupils. The age of pupils and the types of mechanical controls of heating, ventilating, and lighting are factors which determine the kind and degree of responsibility that pupils may be expected to assume. An awareness of the effects of lighting, ventilation, and other factors on comfort and health can be developed through discussion, as well as through practice in classroom management.

The care of plants and animals, such as fish, birds, and hamsters, which are often part of a classroom environment, involves health practices and understandings. Sometimes hazards to health may be involved. Furthermore, the needs of living things for food, water, air, sunlight, and temperature regulation can be learned by pupils as they assume responsibility for the care of ferns or guppies. Even though they may be incidental, health learnings are inherent in such experiences. At times, the teacher may wish to utilize the interests of pupils in a classroom aquarium or conservatory to develop a health education unit which helps pupils to learn that fish and plants have life needs similar to those of human beings.

Housekeeping practices in the classroom which promote safety and reasonable order can be learned early in the school life of the child. Proper storage of lunches brought from home and of coats, caps, boots, and equipment of any sort is an aspect of classroom housekeeping. Provision of storage space which is adequate and properly ventilated is important in teaching pupils to store their belongings in orderly fashion. Name tags on the outdoor clothing of young children facilitate order and care.

The emotional climate of the classroom is of tremendous importance in its influence on the health of all pupils and permeates the entire teaching process. This aspect of the school environment was discussed in previous chapters. In considering the classroom environment as a basis for health education, it is necessary to remember that the health and personality of the teacher, his teaching methods, his success in involving pupils in their own education, and his methods of classroom control are of paramount importance in the development of sound emotional health among pupils.

USING THE ENVIRONMENT FOR PLANNED HEALTH EDUCATION

Health education involves a variety of approaches to the development of practices, attitudes, and understandings which are important for healthful living. In addition to the more or less incidental opportunities for health teaching, discussed in the preceding paragraphs, teachers can develop a series of related learning experiences which utilize the school environment as a basis for study. Interest can be increased and health outcomes more readily achieved in the setting of reality provided by the school facilities where pupils live and work together.

Studying About Lighting

A sixth-grade class, as part of a unit on care of the eyes, considered desirable conditions for reading and studying. The project included learning how to use a light meter and measuring the amount of light in different parts of the room. As a result, the classroom seating arrangement was reorganized so that pupils were able to utilize the best light for reading and other work requiring good illumination. Less desirable areas of the classroom, from the standpoint of light, were used for discussion groups. Each pupil had a vision screening test, followed, if further attention was needed, by a conference with the school nurse. Pupils were advised about the best seating arrangement for them in the classroom if they had a particular visual problem. One goal of this counseling was to stimulate each pupil to seek adequate illumination for himself within the classroom. The teacher encouraged pupils to select suitable places at home for reading, writing, and other activities requiring good illumination.

In another instance, the study of lighting by a combined seventh- and eighth-grade class resulted in renovation of the entire school building. The pupils borrowed a light meter from the public health nurse and measured the illumination in their classroom. The amount of light proved to be inadequate in all parts of the room. They studied standards for good lighting and decided that their room needed to be painted a light color and that new blinds and light fixtures were needed.

A committee was organized to consult with members of the school board and to present and discuss the recommendations for improvement. The school board authorized the purchase of paint, and parents agreed to help with the painting job. A school social was arranged to raise money for new blinds. The local farm bureau agreed to finance new lighting fixtures, and an electrician from a neighboring town agreed to install them. The project extended over several months.

When the room was renovated, parents of the pupils were invited to inspect it as a feature of a parent-teacher meeting. The reaction of the parents was not only one of approval and appreciation, but one of "Why can't the other three classrooms be similarly improved?" During the summer, renovation of the rest of the school was authorized and financed by the school board.

Learning About Sanitation

Various aspects of sanitation can be taught through observation and study of school facilities and procedures. Pupils can learn about heating and ventilation by becoming familiar with the way these items are handled in their own school. What type of fuel is used? How is classroom temperature regulated? Who regulates it? If there is a mechanical ventilating system, how does it operate? Discussion of these questions and numerous other questions that come to the minds of pupils are means of health education.

Similar opportunities for realistic health education are provided by study of the school water supply. If the school has its own water supply, as is the case in many rural schools, pupils can be encouraged to learn what precautions are taken to assure its safety. Study of school water supplies in cities will lead to consideration of public water supplies, including their adequacy, methods of treating water to make it safe, procedures for adding fluoride, and ways to finance water supply systems. School drinking fountains can come under observation, and their sanitary characteristics may be discussed. Demonstration of the proper use of drinking fountains may be appropriate and desirable. The same is true of washing facilities, including instruction in the correct way to wash hands and the correct use of soap and towels.

Pupils may learn how the school disposes of sewage, garbage, and rubbish and gain understanding of these important sanitary measures. The alert teacher will help pupils to understand the significant characteristics of adequate disposal measures and, if appropriate, to recognize deficiencies that exist and how they can be corrected.

A visit to the school kitchen, planned in advance with the school lunch manager, affords opportunities for high school pupils, or even younger pupils, to gain firsthand information about sanitary procedures for food handling and storage. Analysis of regulations which relate to the health of food handlers will assure pupils that the school administration is concerned with protecting them from food infection and food poisoning. They will become interested in the standards used for dishwashing and in methods used to keep flies, rats, and roaches out of the kitchen, dining room, and storage areas.

Real-life projects are to be encouraged. This was done in one school where high school seniors became concerned about a dump which was located within a block of their school. At first, some considered it a convenient place to find spare parts for their cars and construction projects of various sorts. Others felt that it was repulsive, ugly, and smelly. Gradually, they all recognized that it represented a definite health hazard for the school and the community, and they decided to do something constructive about it. Their survey of the dump, their development of plans for its conversion into an extension of the school campus, and their efforts to obtain community action for utilization of the plans provided avenues to learning in many fields, including health and citizenship.

With encouragement and cooperation from their teachers, the project involved work in health (life cycles of flies and mosquitoes, rats as carriers of germs and parasites, and microorganisms which live in garbage); mathematics (land surveying, graphs of statistics, estimates of materials and labor costs); language arts (newspaper articles, talks for civic organizations, radio and television broadcasts); art (models, diagrams, and photographs); distributive education (displays in local store windows); physical education (plans for various sports and recreational areas); industrial arts (drainage, trucking, landscaping); and sociology (community government, financing of community improvements, public opinion, and decision making). In addition to the worthwhile instruction and learning which grew out of these pursuits, the dump eventually was transformed into a recreational area. The whole effort was a dynamic experience in the translation of health knowledge into effective personal and community action.

SAFETY AT SCHOOL

A school accident prevention program has many facets which can be related to classroom instruction. From kindergarten through high school, there must be concern that pupils be protected and that they learn to protect themselves and others from accidental injuries.

Safety in Physical Activities

School accident statistics reveal that playground and gymnasium activities constitute the greatest source of accidents occurring at school. There are many administrative and supervisory controls which can be applied to reduce playground accidents, but these need to be supplemented by instruction if pupils are to learn and practice safety skills. The playground, gymnasium, athletic field, and other sports areas are the laboratories in which such skills and their concomitant attitudes may be developed.

The teacher of young children will concentrate his efforts on helping them learn how to use playground apparatus, to follow rules and directions in play activities, and to develop skills and coordinations which enable them to use their bodies easily and well. Awkwardness and poor coordination can of themselves be causes of accidents. Some classroom activities may develop out of the needs evidenced on the playground. Children can be guided to discuss why they should not push or shove or carelessly throw stones, snowballs, or other dangerous objects; they can learn to take turns and otherwise conduct themselves in an orderly manner.

Older elementary school pupils and high school boys and girls may use physical education and athletic programs as bases for classroom study related to safety. Many projects can be initiated which will enhance understandings and attitudes relating to safe behavior in vigorous activity. Suggested activities include—

1. Investigating accidents that occur in the school physical education and play programs and discussing how they may be reduced in number and severity.
2. Studying first aid for accidental injuries that may occur during activity.
3. Making a survey of equipment and facilities for physical education to determine their adequacy for safe use.
4. Organizing a playground safety patrol, if this seems advisable.
5. Studying safe behavior in a variety of recreational activities such as skating, skiing, swimming, camping, boating, bicycling, and cross-country hiking.
6. Surveying the use of bicycles for transportation to and from school and setting up rules relating to their use and storage on the school grounds.
7. Investigating the hazards in athletics, the importance of adequate conditioning before competition, and the reasons for requiring certain equipment and enforcing definite rules.
8. Comparing the hazards of different sports and discussing the reasons for varying the rules in girls' and boys' sports.

The utilization of actual accidents for teaching purposes requires skill and tact on the part of the teacher. Frequently, an accident is due to an error on the part of one or more persons. To avoid humiliation, the teaching needs to be constructive, with emphasis on ways to prevent similar accidents.

Some accidents are emotionally traumatic for all concerned, making the teacher's task that of restoring emotional equilibrium as soon as possible. Whether this can be done best through verbal expression of feelings, through discharging emotional tensions with vigorous activity, or through some other means is best left to the professional judgment of the teacher.

Safety in Laboratories

Teaching the safe use of laboratory equipment, tools, and machinery is an integral part of teaching in subject areas which require their use. There are several places in the secondary school in which teachers and pupils need to be particularly alert to problems involved in working with equipment and supplies that may be dangerous. These include the various metal and wood shops, home economics classes, chemistry and biology laboratories, ceramics and leather classes, stage scenery construction in drama classes, and similar activities. Each teacher in charge of such a program is responsible for supervising and teaching the proper use of the equipment which is used in his class or group. The use of safety glasses of a type approved by the U.S. Standards Institute[1] should be required in laboratories and shops where there is a possibility of flying particles. Appropriate first aid measures for injuries due to accidents that may occur in the particular shop or laboratory should be studied, demonstrated, and practiced when necessary.

Fire Prevention

Although the primary responsibility for fire prevention is administrative, involving building construction, maintenance, and inspection, the reasons for fire regulations can be explored with pupils and their responsibilities discussed.

The fire drill is a protective measure practiced routinely in schools. Pupils need instruction and practice in orderly evacuation of the building and, in addition, a discussion of the reasons for holding such drills. It is important to build proper attitudes toward fire drills, particularly among high school pupils. Older pupils are likely to consider such drills a joke, unless there is positive instruction regarding them. It might be noted that some teachers may reveal personal attitudes toward such routine procedures which have an undesirable influence on pupil attitudes.

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[1] U.S. Standards Institute, 10 E. 40th Street, New York, N.Y. 10016.

The visit of a fire marshal to the school can be used as a learning experience for pupils. He may be invited to talk with a group of pupils about the work of fire protection personnel and to answer questions about fire prevention in schools. Often the interest in fire prevention at school can be extended to include fire protection in the home and in the community. National losses in life and property and the importance of fire prevention in woods and forests can be dramatized. A unit on fire safety can be developed from an initial interest in school fire protection.

A similar approach can be made in the area of disaster protection. Older pupils, particularly, need to understand the disaster control program of their communities and to be motivated to participate in appropriate procedures. Younger pupils need sufficient instruction to ensure appropriate immediate reaction, without undue alarm, should a disaster occur. School alerts and drills for disaster control need to be approached in the same matter-of-fact way as fire drills.

There are other phases of safety in the school that can be used for teaching. Safety in the classroom, use of stairs and ramps, movement through the halls, and proper behavior around drinking fountains are additional topics that can be utilized in classroom teaching. Pupils may want to study the school accident report form developed by the National Safety Council[2] to help them focus on the particular problems of their own school environment.

THE SCHOOL LUNCH AND NUTRITION EDUCATION

Reference is made in Chapter 7 to some of the health education opportunities inherent in the school lunch program. Perhaps no phase of the school day offers greater possibility for establishing important health practices than that provided by the school lunch. Whether this opportunity becomes significant depends on the interest and skill of teachers in utilizing school lunch experiences for nutrition education.

Mere provision of a well-balanced meal at school is no assurance that all pupils will benefit fully. Food habits vary; food dislikes are common; cultural preferences may limit consumption of nutritionally desirable foods. By observing pupils and studying their eating behavior, teachers can discover areas in which nutrition education is needed.

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[2] A copy may be obtained from the National Safety Council, 425 North Michigan Avenue, Chicago, Ill. 60611.

Teaching about nutrition in the classroom can center around the lunch experience as part of good nutritional practices throughout the day. The wise teacher recognizes that not all children need to conform to the same eating pattern to be adequately nourished and that it is nutritionally desirable for people to consume a wide variety of foods and to learn to accept and include new foods in the diet. Based on the nutritional needs and interests of pupils, activities can be developed around—

1. Trying to like a variety of foods.
2. Analyzing the nutritional value of the noon meal and determining the foods which need to be included in other meals to balance the daily dietary intake.
3. Planning meals for the school lunch and working with the lunchroom manager in having student-planned meals served periodically.
4. Studying sanitary food handling practices.
5. Observing and evaluating eating practices in the lunchroom to determine the kind and amount of food wastage.
6. Surveying the lunchroom environment and making suggestions for more pleasing and comfortable eating arrangements.
7. Learning to select foods wisely, being careful to include essential nutrients in appropriate amounts.
8. Cooperating in maintaining a clean, pleasant, attractive noon lunch environment.
9. Evaluating the effect of the availability or nonavailability of carbonated beverages, candies, and confections.
10. Developing proper eating behavior, including leisurely eating, correct use of eating utensils, and practice of table courtesies.
11. Discussing and evaluating the nutritional needs of athletes and the food fads and fallacies to which some of them subscribe.

These and many other activities can be initiated around the school lunch experience for the purpose of improving nutritional knowledge and practice. Eating together at school can be a significant and effective experience in health education.

TEACHING FOR MENTAL HEALTH

A school environment includes people as well as buildings, grounds, and equipment. The interaction of personalities in a variety of situations at school is a constant yet ever varying process. Incidents occur which cause anger, frustration, and fear; other situations engender courage, cooperation, and confidence. Pupils interact with each other and with teachers and other adults at school. Problems arise; discussion and interpretation are needed; decisions must be made. Around the many situations, incidents, and procedures originating in the school, valuable mental health attitudes and understandings can be built.

Individual Guidance

Since the experiences and needs of pupils vary, much teaching for mental health will be accomplished on an individual basis. As the teacher helps a child or an adolescent to understand himself, to face reality, to gain a basis for self-respect, or to improve his group relationships, he is contributing to the goals of mental health. This type of teaching goes on more or less continuously and often unobtrusively day by day. On occasion there is need for individual conferences with certain pupils to discuss and evaluate particular problems, and sometimes teachers need assistance from specialized guidance personnel in reaching a solution. However, the individual guidance which the teacher provides as a part of his daily work is an important aspect of mental health education.

Group Experiences

School situations and occurrences which provide opportunity for classroom discussion and decision bearing on pupils' emotional health are legion. An incident on the playground may lead to discussion of appropriate playground behavior and the importance of learning to control one's temper or to respect the rights of others. Littered lunchrooms or schoolgrounds may stimulate discussion of the need for each person to share responsibility for maintaining a healthful environment for all. An impending game with a rival high school may furnish the setting for consideration of the nature and importance of sportsmanlike behavior by a group of high school pupils. Planning for school field days may involve discussion of ways of working together and the importance of each person's doing his share in a group project to help make it succeed. Other illustrations of mental health teaching inherent in the ongoing activities of the school are too numerous to list; there are personality interactions in every situation. The teacher with insight and understanding will readily recognize the many opportunities for promoting emotional health which occur as each day goes by.

Planned Units of Instruction

Individual and group experiences at school can often be utilized for more extensive and related instruction than that which occurs in one discussion or is limited to one experience. The experience or situation at school may be the point of departure, but the projects and learning experiences which teachers and pupils plan together may lead them into many and diverse facets of mental health education. Teacher and pupils can set about—

1. Considering the ways in which school experiences can be most satisfying.
2. Analyzing the club and activity programs of the high school to determine their relationships to social adjustment and to the provision of opportunity for participation by all.
3. Formulating a code of behavior for school dances, parties, and athletic events.
4. Studying the ways in which different persons contribute to the achievement of a common goal.
5. Evaluating the social life of the high school in terms of democratic ideals.
6. Setting up a schedule for the individual which provides a balanced day in terms of study, work, recreation, and rest.
7. Evaluating the reasons why balanced living is important.

There is little doubt that the school experiences of children and young people are fertile opportunities for mental health education —individual or group, incidental or planned. Good teachers are constantly utilizing them.

HEALTH SERVICES AND HEALTHFUL SCHOOL LIVING

During his school years, a pupil receives certain health services which are designed to protect and improve his health.[3] These services help pupils understand the factors that affect health and make it possible for them to live healthfully. A broad interpretation of a pupil's environment permits inclusion of experiences with school health services as environmental factors related to healthful school living. School health services include (a) measures to appraise each pupil's health so that the pupil, his parents, and his teachers may become familiar with his health assets and liabilities; (b) follow-up to encourage correction of remediable defects and alleviation of those that cannot be corrected; (c) emergency care in case of sudden sickness or injury; and (d) measures to prevent or control communicable diseases. Activities in each of these four areas can be utilized to help pupils learn how to live healthfully.

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[3] National Education Association and American Medical Association, Joint Committee on Health Problems in Education. *School Health Services.* Second edition. Washington, D.C., and Chicago: the Associations, 1964.

Health Appraisal and Follow-Up Activities

Health education may precede or follow various procedures used to appraise pupil health; in many instances it will both precede and follow. Prior to vision and hearing tests, for example, the teacher may interpret the purposes, methods, and limitations of testing procedures. As a result of experiences with such tests, pupil's interest may be aroused in studying about eyes and ears and sight and hearing. The alert teacher will recognize this interest and satisfy it by devoting appropriate time to these subjects. He will help pupils apply what they learn to situations in the school and home.

Similarly, health education is related to periodic health examinations. Greatest value will result when the examining physician, either the pupil's private physician or the school physician, takes full advantage of the educational implications of the health examination. The examination does not serve educational purposes if it is so hurried that the pupil and the physician do not develop rapport. Under such circumstances, the pupil may develop a feeling of indifference and resent the fact that he had no opportunity to express himself or to learn what the examination revealed. On the other hand, the establishment of good rapport and the provision of opportunities to ask questions during the examination create a satisfying experience for the pupil that he will be willing to repeat as needed. He will learn that periodic checks on his health status are part of health maintenance and improvement. Also, he will learn that he needs to consult a physician whenever there are serious or prolonged symptoms of sickness, regardless of the results of previous health examinations.

Follow-up of problems discovered by health appraisal procedures can be an educational process, based on personal conferences between the physician, nurse, or teacher and the pupil or his parents. A satisfying conference results in the formulation of a plan for the solution of the problem and helps the pupil develop a sense of responsibility for his own health. He learns the significance of his health problem, the value of seeking needed treatment or other attention, and the available reliable resources for obtaining help. He learns that his personal physician and dentist are the ones to consult when medical or dental treatment is needed.

Health Education Related to Emergencies

Every instance of sudden sickness or injury presents a "teachable moment," for at such times pupils are interested in what happened, what was done, and how similar events can be prevented. A high school pupil becomes suddenly ill with acute abdominal pain. He is taken to the "health room," and someone immediately gets in touch with one of his parents. The nurse, or someone prepared in first aid, advises that no food, water, or medication be given and that the youth be seen as soon as possible by his physician. After an examination by his physician, the pupil is taken to a hospital and immediately operated on for appendicitis.

The classmates of this pupil will undoubtedly ply the teacher with numerous questions, some of which he will be able to answer; others will have to be referred to a physician or nurse. What prompted the suggestion that the pupil should have no water, food, or medication? Is surgery the only treatment for appendicitis? Did the teacher know it was appendicitis? Can appendicitis be prevented? Is it related to constipation? Is all pain in the abdomen caused by appendicitis? Discussion of these and other questions presents opportunities for pupils to learn that appendicitis is a serious emergency which requires prompt medical attention, that sudden severe pain may be a sign of appendicitis but only a physician can make a diagnosis, and that food, water, or medication may aggravate the condition of one who has appendicitis.

Appendicitis is used here only as an illustration, for interest may be aroused by any case of sudden sickness or injury. Utilization of such interest leads to a consideration of the particular sickness or injury and permits interpretation of school policies related to the care of pupils who experience such problems. Healthful school living requires that pupils learn how to make use of health protective services provided in the school and the relationship of such services to the diagnostic and treatment functions of their own physicians.

Prevention and Control of Communicable Disease

Community efforts to prevent and control communicable diseases depend partly on education of the public about preventive and control measures. Schools can aid in such efforts by familiarizing pupils with present-day knowledge concerning diseases. Such information needs to be adapted to the age, understanding, and interests of pupils, with rather limited information being presented in the elementary grades and more comprehensive and extensive material presented in the secondary school. It is best restricted to matters of concern to nonmedical persons, leaving details of pathology, diagnosis, and treatment to the physician.

Many communicable diseases may be prevented by immunization or vaccination, including diphtheria, whooping cough, tetanus, smallpox, measles (rubeola), poliomyelitis, and mumps. In the offing are immunizations for other diseases, such as German measles (rubella). Pupils can learn the value of such preventive treatments and the desirability of receiving them during infancy, according to the family physician's recommendation. They also can learn that reinforcing immunizations at later times are essential for continued protection. Most children and adolescents will receive their immunizations from their family physician; others, for a number of reasons, may receive them through a community program established for that purpose.

Effective education about communicable disease includes more than information concerning preventive treatment. It acquaints pupils with school and community procedures designed to prevent the spread of disease, and it includes emphasis on the importance of staying home when ill, the need for isolation, and the need for professional medical diagnosis and treatment. Consideration is given to water and food sanitation as measures designed to prevent disease. At the high school level, particular attention is given to measures for the control of syphilis, gonorrhea, tuberculosis, and influenza, including methods used to identify those who contract these diseases and the importance of their obtaining prompt professional treatment.

Discussing with pupils the measures used to combat communicable disease helps them to understand how their health is being protected, what they can do to protect their health, and how they can assist in community efforts to control communicable disease. This is a big undertaking, but one which pays rich dividends.

RELATIONSHIP WITH TOTAL SCHOOL HEALTH PROGRAM

The suggestions offered in this chapter are indicative of the opportunities for health teaching which are found in varying degrees in every school situation. Good teaching involves a study of the needs in a particular situation and gears instruction to these needs. The interests of pupils vary with their experiences; the rural pupil has a different school environment from that of his urban cousin. The teacher will utilize pupils' environments for teaching rather than trying to project pupils into unfamiliar situations.

The total program in health education involves a great deal more than is delineated here. The pupil's life at home, in his neighborhood, and in his community must be seen and understood, as well as his life in the school. The need for development of sound understandings in the health sciences cannot be overlooked. The goals of health education that contribute to the broader goals of education and life adjustment are of paramount concern. The ideas discussed here will become more meaningful when they are considered within the framework of the total school health program.

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